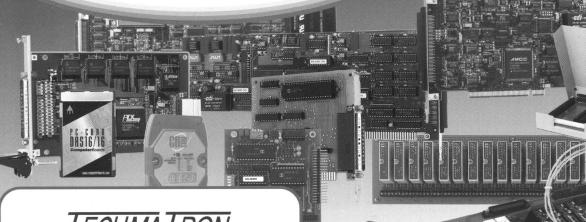
ComputerBoards





TECHMA TRON

INSTRUMENTS INC.

MONTREAL: Tel: 450-689-4572 • Fax: 450-689-0868
TORONTO: Tel: 905-564-2588 • Fax: 905-564-2589
VANCOUVER: Tel: 604-618-0530 • Fax: 604-618-0531
OTTAWA: Tel: 613-829-9246 • Fax: 450-689-0868

email: sales@techmatron.com

Volume 21

Measurement and Control Product Guide

QUALITY & SERVICE

Lifetime Product Warranty

Every product manufactured by ComputerBoards, Inc., is warranted against defects in materials or workmanship for the life of the product, to the original purchaser. Any products found to be defective in material or workmanship will be repaired or replaced promptly.

Lifetime Harsh Environment Warranty™

Any product manufactured by ComputerBoards, Inc., that is damaged due to misuse may be replaced for only 50% of the current list price. I/O boards face some harsh environments, some harsher than the boards are designed to withstand. When that happens, just return the board with an order for its replacement at only 50% of the list price. ComputerBoards does not need to profit from your misfortune. Your local distributor will honor this warranty anywhere in the world. Your price will be 50% of the USA list price plus the local import duties and taxes, which in general does not exceed 20% of the value of the product. Please fax us in the USA if you have questions about this warranty. The replacement discount from list price is based on the U.S.A. list prices in this catalog and is valid only for products purchased before the next catalog volume number is issued. If prices go down or costs go up in future catalogs, the replacement discount may be adjusted to reflect current conditions, but, you have our pledge that it will always be as fair as possible.

Free Technical Assistance

ComputerBoards, Inc., was founded by ex-MetraByte data acquisition professionals who have been helping customers with data acquisition boards since 1984. The tradition was carried with the founders to ComputerBoards, where our dedication to competent, responsive technical support, both before and after the sale, is being applied through high-quality staffing and support tools, such as expert systems and state-of-the-art test equipment. Your local distributor is trained to provide professional technical assistance, and you are also invited to contact us via fax in the USA.

ORDERING & TERMS

HOW TO ORDER

Please contact your local distributor for information on ordering and terms. Your distributor's name and address should be listed on the cover of this catalog or included on the distributor reference on the inside back cover. If not and you wish to learn the name of a distributor in your area, please contact ComputerBoards at (508) 946-5100, via fax at (508) 946-9500, email us at info@computerboards.com or visit our web site at www.computerboards.com.

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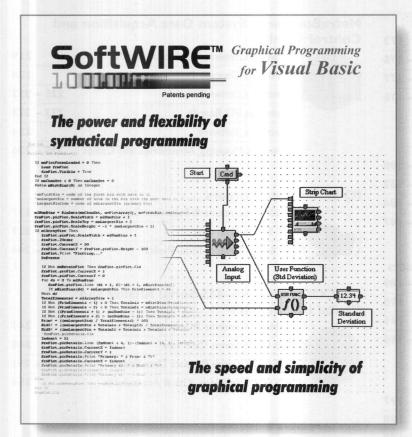
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New Product Highlights



SoftWIRE™

A revolutionary new way to program!

- Powerful graphical programming interface for Visual Basic®
- Seamlessly integrates with your Visual Basic® code
- Free Run-Time License
- Ideal for non-programmers, veteran programmers, OEMs and systems integrators

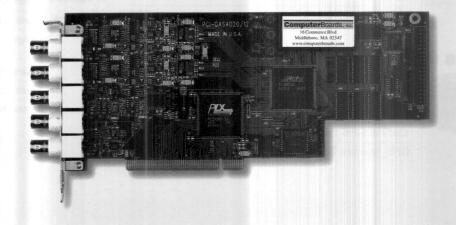
See Pages 6-10

PCI-DAS4020/12

Ultra High-Speed, 20 MHz PCI-bus Compatible, 4-Channel, I 2-Bit Analog Input Board with Dual Analog Output Channels & 24 Digital I/O bits

- 20 MHz sample rate
- I2-bit A/D resolution
- 4 input channels
- One A/D per channel
- · Bus-master & Scatter-gather capable
- · Dual 12-bit D/As
- · Analog and digital triggering
- 24-bits high-current digital I/O
- Fully Plug-and-Play
- Fully Autocalibrating





The New PC-CARD family

High performance and low cost PCMCIA/PC-CARD compatible data acquisition, control and communications cards.

- New, rugged 50-pin connectors
- 12 and 16-bit resolutions
- New 16-bit board with analog outputs (PC-CARD-DAS16/16-AO)
- New 48-bit digital I/O board (PC-CARD-DIO48)
- New larger FIFOs
- Extensive software support
- · Fully Plug-and-Play

See Pages 145-166





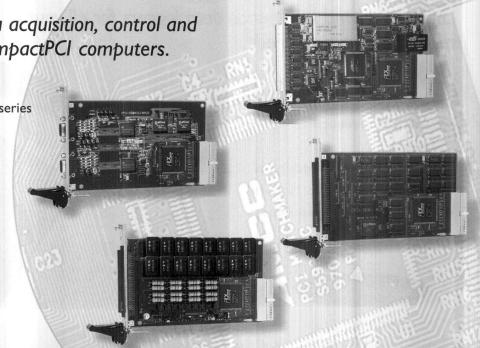


The cPCI family

Offering a wide variety of data acquisition, control and communications cards for CompactPCI computers.

- · High-density 3U format
- Fully compatible with our standard PCI series
- 12 and 16-bit resolutions
- Extensive software support
- · Hot-swap support
- · Fully Plug-and-Play

See Pages 91-122



New Product Highlights



The MetraBus family

When your application is too big for a plug-in board solution, but you still want plug-in board prices!

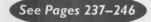
- Up to 512 digital I/O bits per PC slot
- · Up to 256 analog I/O channels per PC slot
 - · Very low cost per point
 - Wide variety of I/O boards & functions
 - ISA, PCI, cPCI and PC/104 compatible
 - Wide selection of packaging and mounting options
 - Universal Library software support
 - Windows 95, 98, NT & 2000 support

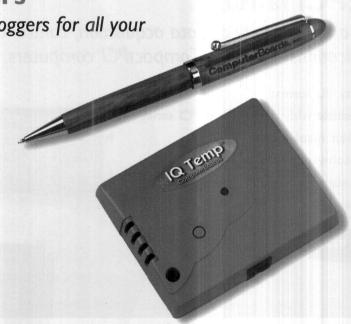
See Pages 219-236

IQ-Series Data Loggers

Low-cost, high-performance data loggers for all your remote monitoring needs.

- · Easy to use
- Rugged case
- 12 -bit A/D resolution
- Small size
- Wide assortment of input types
- Long battery life (up to 10 years)
- Data placed directly into Excel

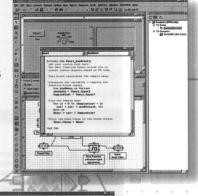


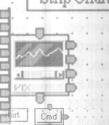




Patents pending

Graphical Programming for Visual Basic

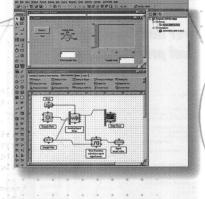






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Application Packages and Programming Tools

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5

Introducing SoftWIRETM

Graphical Programming in Visual Basic®—A revolutionary new way to program!

Introduction

Syntactical programming has been around since the early days of computers. More recently, graphical programming languages have been introduced and are now a popular alternative

to writing hard core, textbased syntax. What's been lacking is an easy way to combine the speed and ease of use of graphical programming with the flexibility and efficiency of writing code in an industry standard language. Until now—Introducing Soft-WIRE.

SoftWIRE is a complete graphical programming package

Select the functions you need from a simple menu. Place the objects on the screen where you'd like them. Connect the objects with a few simple dragand-drop wires. Run the program. It's as simple as that! Non-programmers can create powerful applications without learning to write code. Experienced programmers save time and money by taking advantage of the speed of graphical programming.

Softwire and flexibility of syntactical programming

The power and flexibility of syntactical programming

Free syntactical programming

Free states for floated

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programming. SoftWIRE gives you both!

All SoftWIRE control blocks are fully COM/ActiveX compatible and are easily interfaced to your Visual Basic programs. It's also easy to convert your existing ActiveX controls for use with

the SoftWIRE graphical programmer. An easy-to-follow public specification tells you how.

Applications

SoftWIRE supports ComputerBoards' complete line of measurement, control and GPIB interfaces. Easy-to-use and powerful DAQ control blocks support the complete gamut of functions you will require. While some graphical programming languages force you to program at extremely low levels, Soft-WIRE controls are highly integrated: each control provides a great deal of functionality. This eliminates the need to learn a large number of low-level control blocks.

Another key advantage of SoftWIRE's COM/ActiveXimplementation is that all control block parameters may be set via program control or with

easy-to-use property page menus. Some graphical programming languages force you to hard code block parameters with another icon or control block. In SoftWIRE, right click on any object and configure its operating parameters in its easy-to-understand property page. Setting the channels you want to sample, or setting your sample rate is as easy as typing in the desired number. Of course all control parameters are also available to your programming interface and are easily controlled by your program.

SoftWIRE is an extension to Visual Basic

Unlike other graphical programming languages, SoftWIRE runs in Visual Basic, the world's most popular application development language. Is there a graphical function you need that's not provided? Do you have an I/O board or instrument that's not supported? In SoftWIRE, there's no problem. You're already in the Visual Basic environments o you can write a Visual Basic routine and you're ready to go.

SoftWIRE is ideal for—

Non-Programmers

Write Visual Basic programs without learning Visual Basic, and without ever having to write a single line of code. SoftWIRE is so easy to use and so intuitive, even a non-programmer can create fully functioning applications in minutes. Select the function and GUI blocks you'd like to use, place the blocks where you'd like them, connect them with simple drag-and-drop wires, and press Start. It's that easy!

SoftWIRE is also a great tool to help you learn Visual Basic. Learn the ins and outs of using forms and property pages without having to write code. When you're ready to start writing VB code, use the SoftWIRE *User Function* block to help integrate your code into your application.

With the variety of functions already provided by SoftWIRE, you may never need to write any text-based code. However, it's good to know that you can if you want to, and that SoftWIRE will even help teach you how!

Veteran Programmers

Experienced programmers can take advantage of the speed of the SoftWIRE interface and the wide variety of power-

ful function and GUI objects. We also understand that you don't want to throw out the investment you've already made in your software. Once you've created your own ActiveX GUI components, you'll certainly

want to keep using them. No problem. SoftWIRE is completely ActiveX (COM) based. We'll even show you how to adapt your current objects to make them compatible with SoftWIRE's powerful drag-and-drop wire interface. Time is money, and SoftWIRE will help you save both.

OEMs and Systems Integrators

Order SoftWIRE today and pay nothing!

Use SoftWIRE for one month absolutely free!

After 30 days, we're sure you'll want to call, place your order and get your unlock code. Then you can continue using SoftWIRE, one of the most revolutionary software products ever!

Compile the applications you've created in SoftWIRE and you may distribute the .EXE programs you've generated royalty free. SoftWIRE will save you time and money while you develop your application, and save you money on the software you provide to your customers. It's a double win for OEMs and systems integrators.

Not just for DAQ and GPIB applications!

SoftWIRE is much more than simply a great test and measurement software solution. It's an ideal software interface for any Visual Basic application. Whether your application is home or office automation, X-10 control, laboratory analysis, or database management the features that make SoftWIRE an ideal test and measurement solution still apply. New

SoftWIRE controls for database, home and office automation are available on our web site and are yours to download as they are developed.

System Requirements & Supported Hardware

System Requirements

- PC with a Pentium-class processor; Pentium 90 or higher processor recommended
- Microsoft Visual Basic 6.0 or later. Professional or Enterprise editions
- CD-ROM drive
- VGA or higher-resolution monitor; Super VGA recommended

- Microsoft Mouse or compatible pointing device
- At least 40 Mbytes of free storage space (in addition to that required by your Visual Basic installation)
- Any ComputerBoards DAQ or GPIB board (required for I/O applications only)

Supported Hardware

SoftWIRE supports the entire ComputerBoards data acquisition product line with custom SoftWIRE controls.

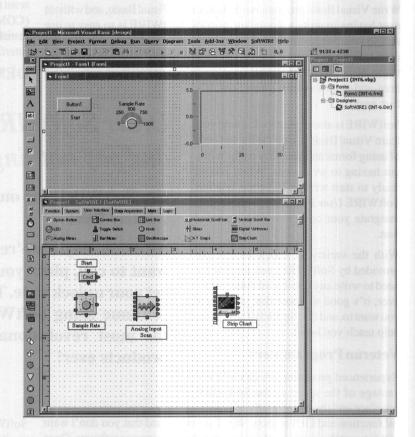
Programming with SoftWIRE

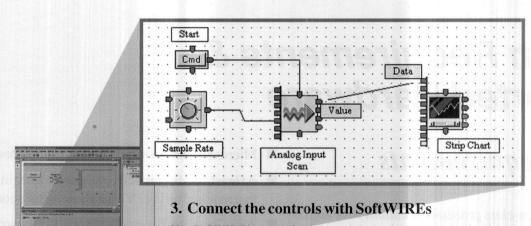
1. Getting Started

The SoftWIRE interface is based on two windows. The first is the standard Visual Basic "Form" (the upper window). The second window is the SoftWIRE Diagrammer (the lower window in this screen). In SoftWIRE you write your programs in the Diagrammer, while (as in VB) your user interface GUI objects/controls appear in the Visual Basic Form.

2. Select your Controls

Start your program (in the Diagrammer screen) by simply selecting the functions you'd like from the control blocks shown in the tabbed menus. In this example we've selected a command button, a rotary input dial, an analog input scan block and a strip chart display. As you select blocks, they will automatically appear in the Diagrammer window. Corresponding blocks will also appear in the standard VB form for those blocks with user interface (control or display) functions. Arrange the objects you've selected in both the Diagrammer and VB Form by dragging them to the desired locations.

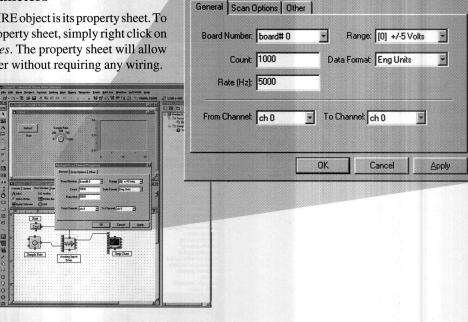




Use SoftWIRE's powerful drag-and-drop wires to connect the objects. The user interface is extremely simple and intuitive. Connect the output of your *Analog In Scan* to your *Strip Chart* by simply placing a wire from the output VALUE pin of the *Analog In Scan* object to the DATA pin of the *Strip Chart* object. Mouse-over any pin and its name is automatically displayed. There's no need to remember where the various pins are located.

4. Set your system parameters

A powerful feature of a SoftWIRE object is its property sheet. To view and adjust an object's property sheet, simply right click on the object and select Properties. The property sheet will allow you to set any object parameter without requiring any wiring.



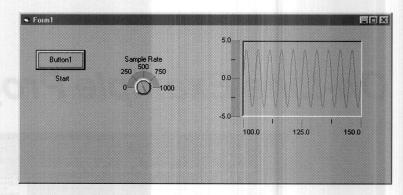
AnalogInScan Control Properties

5. Run the Program

With SoftWIRE, even non-programmers can create powerful programs in minutes. Ready to run? Click on the familiar Start (u) menu item to run your program. Want to make a stand-alone executable program? Simply use Visual Basic's Make.exe function.

SoftWIRE programs made into .EXE executables are 100% pure VB and run without a hitch on virtually any computer.

These .EXE programs may be distributed royalty free! There are no extra "Run Time" charges.

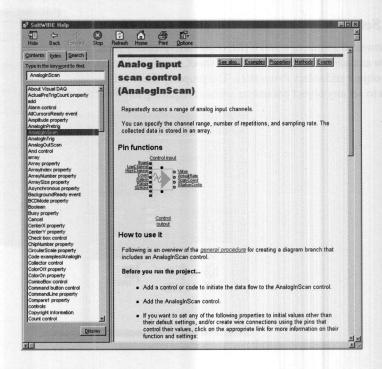


6. Write a special function Need a function not provided by SoftWIRE? No Problem! Private Sub User1_RunBlock() You're in Visual Basic. You're free to write any VB code The User Function Block allows you to create custom objects based on VB code you'd like. The User Function control block offers an This block calculates the sample mean. extremely easy way to integrate your VB code with your Dimension the variables & capture the SoftWIRE programs. Place the User Function block on the function block inputs Dim AtoDData As Variant AtoDData = User1.InputX SampleSize* = User1.InputY Diagrammer screen, double click on it, and a VB syntax window automatically appears. Simply place your code at the 'Add your custom code here' comment. For it = 0 To (SampleSizet - 1) tot! = tot! + AtoDData(0, it) Mean! = tot! / SampleSize% ean value to the block output User1. Value = Mean!

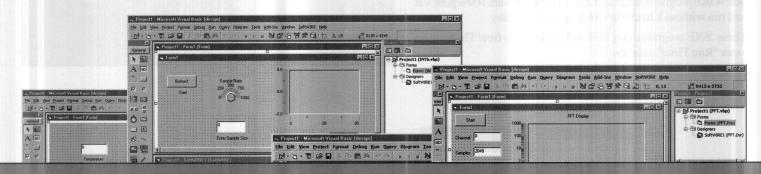
Premium Quality, Superior Performance and Low Prices.

7. Need help?

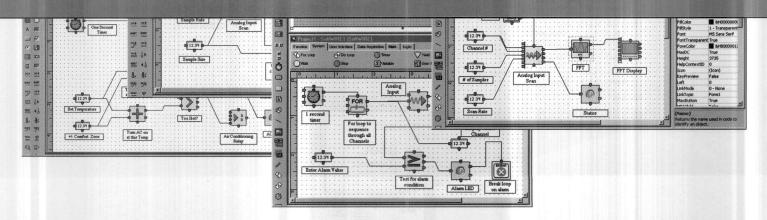
SoftWIRE provides a comprehensive online help system. Though you're not likely to need them, SoftWIRE also includes over 100 example programs demonstrating the use of every SoftWIRE control.



On-Line Example Programs



Visit our web-site for an on-line demonstration of SoftWIRE! www.computerboards.com/softwire



HP VEE

ComputerBoards is proud to offer both HP VEE and HP VEE Lab; powerful, easy-to-use graphical programming for data acquisition, test, and measurement applications!

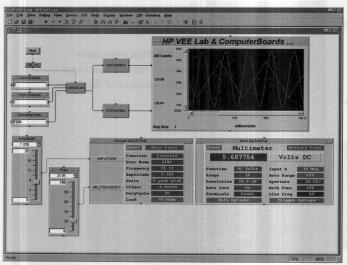
HP VEE Lab

Introduction

Graphical programming is a great way to create your application software. Combining an easy-to-use interface and powerful built-in functions, and without the boundaries of standard menu- or text-driven applications, graphical programming is an ideal software solution for data acquisition and test applications.

The adoption of graphical programming has historically been hindered by pricing issues! Though quite powerful, fully configured graphical programming packages have historically been very expensive. HP VEE Lab from Agilent Technologies® is a truly affordable graphical programming environment designed specifically for data acquisition, test, measurement and control in laboratory and small test system applications. HP VEE Lab now brings the power of graphical programming to an affordable level even for the smallest applications. See the price list, or call for pricing information. You'll be amazed at the low price!

If you application calls for more power than available from HP VEE Lab, you need HP VEE. HP VEE adds a variety of powerful features that make it an ideal solution for even the largest application. The full HP VEE pacakge offers free run-time distribution and is also an ideal package for OEMs.



HP VEE Lab allows you to create powerful data acquisition and test applications using data acquisition boards and/or GPIB-based instruments

HP VEE and HP Lab are easy to use!

The HP VEE family's graphical programming environment is extremely easy to master. Select a few function blocks, connect them up with wires and you're ready to go! Double click on any of the objects and configure its operating parameters with easy-to-understand menus.

Some graphical programming languages force you to program at very low levels. HP VEE and HP VEE Lab's powerful, high-level, fully integrated function blocks eliminate the need to learn large numbers of low-level blocks and let you concentrate on the application you're developing.

HP VEE Lab is powerful!

You need powerful, full-featured software that meets 100% of your application's technical requirements. HP VEE Lab is a comprehensive, high-speed software package that's up to the task. If you need more power still, HP VEE offers virtually limitless capabilities.

Support for plug-in boards & GPIB instruments!

Develop your application based on I/O boards, IEEE-488 instruments, or both. The HP VEE family works with all ComputerBoards I/O boards as well as boards from Data Translation and GPIB boards from most vendors. A powerful Instrument Manager greatly simplifies setting up IEEE-488 systems. They also include a comprehensive instrument library. The drivers for your GPIB instrument are likely to be already written.

Includes hundreds of analysis & display functions

HP VEE Lab provides over 200 math and analysis functions, ranging from elementary math to calculus to DSP and statistical functions. A large number of data display functions including meters, thermometers, X-Y plots, and strip charts are provided, as well as user interface objects ranging from simple push buttons to variable slide and rotary virtual instrument panels. See the table on page 14 for a comparison of functions and features.

Conclusion

At our remarkably low price, HP VEE Lab is perfect for the professional who wants to save time and money, but not compromise performance or capability. If your application requires more power still, or if you need to distribute run-time applications that you create HP VEE is the ideal solution.

ComputerBoards, nc.



Visual Programming for Virtual Instrumentation

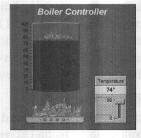
ComputerBoards is proud to offer HP VEE and HP VEE Lab in this catalog of important new products. HP VEE is the ideal graphical programming environment and has been field proven by Agilent Technologies, a name you can trust.

In keeping with the exciting changes in personal computer data acquisition and control, now becoming known as Virtual Instrumentation, ComputerBoards has developed an interface to the premier visual programming environment: HP VEE. With it you can develop virtual instrumentation that gives you a competitive advantage by making product quality an integral part of your organization.

From product development, through production test, and on to customer service, the HP VEE family gives you the tools to build a totally integrated environment.

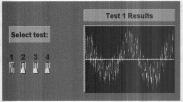
Operator Interface

Create operator interfaces in minutes. A complete assortment of user input and data display features. Use pop-up dialog boxes to conserve screen space. Secure your programs from tampering.





Simulate instrument panels with HP VEE.



Features for icon alignment make it easy to create a professional look for your programs.

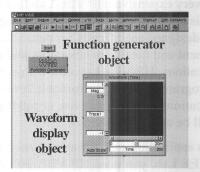


HP VEE shows the current status of three instruments in this test system

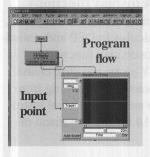
An HP VEE program is constructed by selecting objects from the pull down menus.



Device menu holds a function generator object.

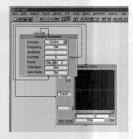


Placing the objects on the form in a manner that's both pleasing to the eye and logical to view.



And connecting the objects with wires at input points, output points and controlling program flow by connecting the objects program flow points with wires.

You can define program flow, or you can allow HP VEE to select a logical program flow for the objects in your program.



Run your program by pressing the START button.

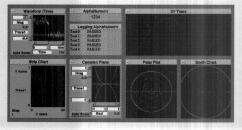
The function generator creates a wave. The scope displays a trace of the wave.



It's easy to select animation of data and execution flow, as shown in these toolbar icons



Using HP VEE's line probe makes it easy to examine data as it changes throughout your program.



Data Displays Reduce development time with flexible data displays. Choose from a wide selection to suit your needs.

	strDown(str)	sinh(x), cosh(x)		Probability	y0(x), y1(x)
Logical	strRev(str)	tanh(x), coth(x)	Calculus	random(low, high)	yn(x, n), Ai(x), Bi(x)
and, or, xor, not	strTrim(str)	asing(x), acosh(x)	integral(x), deriv(x, 1)	randomize(x)	
	strLen(str)	atanh(x), acoth(x)	deriv(x, 2)	randomSeed(seed)	Hyper Bessel
Bitwise	strFromThru(str,		deriv(x, order)	perm(n, r)	i0(x), i1(x), k0(x),
bit(x, n)	from, thru)	Time & Date	defintergral(x, a, b)	comb(n, r)	k1(x)
bits(str)	strFromLen(str,	now()	derivAt(x, 1, pt)	gamma(x)	
setBit(x, n)	from, len)	wday(date)	derivAt(x, 2, pt)	beta(x, y)	Signal Processing
clearBit(x, n)	strPosChar(str,char)	mday(date)	derivAt(x, order, pt)	factorial(n)	fft(x), ifft(x)
bitOr(x, y)	strPosStr(str1, str2)	month(date)		binomial(a, b)	convol(a, b)
bitXor(x, y)	Power	year(date)	Regression	erfc(x)	xcorrelate(a, b)
bitCmpl(x)	sq(x), $sqrt(x)$	dmyToDate(d, m, y)	linear	erf(x)	bartlet(x)
bitShift(x, y)	cubert(x), recip(x)	hmsToSec(h, m, s)	logarithmic		hamming(x)
Real Parts	log(x), log10(x)		exponential	Statistics	blackman(x)
abs(x), ceil(x)	$\exp(x), \exp(10(x))$	Array	power curve	min(x), max(x)	rect(x)
signof(x)		init(x, value)	polynomial	median(x), mode(x)	
ordinal(x)	Polynomial	rotate(x, numElem)		mean(x), sdev(x)	
round(x)	1: $poly(x,[a0 a1])$	concat(x, y)	Data Filtering	vari(x), rms(x)	
floor(x)	2poly(x,[a0 a1 a2])	sum(x), prod(x)	polySmooth(x)		
intPart(x)	3poly(x,[a0 a1 a2 a3])	sort(x), $totSize(x)$	meanSmooth(x,		
fracPart(x)	4poly(x,[a0 a1 aN])		numPts)		

Free Start-Up Support

HP VEE Lab support is available directly from ComputerBoards or your local distributor.

When you buy HP VEE from ComputerBoards you get two sources of world class support: Free support on data acquisition boards and drivers for as long as you own our products and free HP VEE support for the first 90 days of ownership direct from ComputerBoards. After 90 days we suggest the purchase of a Agilent Technologies® support contract. *If* you need it! Agilent's world class support starts when you register your new HP VEE. At that time you will receive, at no charge, access to:

- -HP VEE WEB site/BBS
- -HP VEE Internet Users Group
- -HP VEE Monthly Newsletter
- -HP VEE 24 hour faxback service

You can contact Agilent by phone, fax or the Internet to get high-quality service. Enjoy a complimentary 90 day start-up phone support contract with your purchase of HP VEE for Windows. Scan the Internet and bulletin boards for up-to-the-minute information on HP VEE, including current driver lists and application notes.

What About Support & Training from Agilent Technologies & ComputerBoards

Get classroom instruction from an HP VEE expert at your site or at an Agilent customer training center near you. To register, contact 1-800-472-5277 in the United States.

Ordering Guide

HP VEE Lab

Graphical programming environment for laboratory and small test system applications.

HP VEE

Graphical programming environment for professional developers and larger systems.

Order HP VEE or HP VEE Lab today, or call for a free demonstration system on CD ROM!

HP VEE Lab or HP VEE?

Features Comparison

Functions and Features	HP VEE Lab	HP VEE
Easy-to-use Graphical Programming	~	~
Non-text-based Programming	V	~
Intuitive Property Sheet Interfaces	V	1
Active X and Web Tools		V
Data Acquisition	max. V Administra	
GPIB Instrument Control	V	~
Serial/RS-232 I/O Control	V	~
Analog Controls & Indicators	V	~
Strip chart recorders	V	· ·
XY Plots	V Transa	V
Analog meters & bar graphs	V (100)	~
Slider and knob analog controls	V	~
Polar plots		~
Tank level displays	may V	V
Digital Controls & Indicators		V
Toggle & slide switches	✓ malifernature	
Push button switches		V
Alarm/digital indicators	V	V
Alphanumeric Controls	W 1	~
Radio buttons	~	V
Drop down menus	1 × 1	~
Pop up lists	V	~
Cyclic buttons	✓ spelliste	
Debugging Functions	V	V
File I/O Interface	V	V
Analysis & Mathematics	~	~
Linear algebra and array operators	V	~
Probability & statistics	nerticandi Arien esse	
Curve fitting	no You Tasigolon	-
Differential equations	Kin maaga	V
Signal generation	V II de la	eville V
Integration/differentiation	Y	-
Conditional Statements	Vertille	-
Do and Do While functions	· · · · · · · · · · · · · · · · · · ·	V
DDE Capability		-
Test Sequencing		V
Remote Web Monitoring		~
Unlimited Runtime License		resta in Valor
User Function & Save Objects Menu Opti	ons	V
Profiler		~
Program Explorer		
Execute Program Object		-
Find		V

Universal Library for LabVIEW™

Complete Interface to National Instruments LabVIEW Graphical Programming Environment

LabVIEW 5.0 Data Acquisition Board Library

If you are a LabVIEW user you will be pleased to know you have complete support for ComputerBoards data acquisition and control boards available for LabVIEW 4.x and the new 5.0

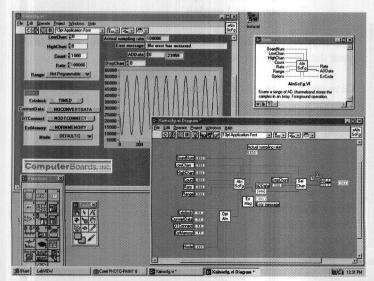
Universal Library for LabVIEW is a complete programmers library (see Universal Library data sheet) modified to work flawlessly in the Lab-VIEW graphical programming environment. Select blocks that represent analog inputs, outputs, digital I/O and counters. Place them on LabVIEW VIs and run your LabVIEW VIs with ComputerBoards data acquisition boards.

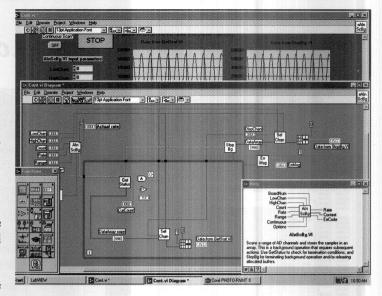
How Does the Interface Work?

When you install Universal Library LabVIEW Extension, a directory is added to your installed LabVIEW software. That directory is called c:\LABVIEW\VI.LIB\CB. In that directory is placed a library with all the Universal Library functions accessible as LabVIEW graphical programming blocks. There are many example virtual instruments (VIs) as well.

The two diagrams here are examples of LabVIEW programs written with Universal Library. You can see the cbAIn() function depicted as a block diagram with inputs for all the analog input parameters and an output which is the analog value returned from the function. Connect the inputs to constants or to user input panels and connect the output to a graph or analysis block, as is done here.

If you are familiar with LabVIEW, you will find using the Universal Library interface to LabVIEW a snap. There is nothing to learn. Just familiarize yourself with the function block using the Universal Library manual or the on-line help, and start connecting up blocks.





LabVIEW Examples

With every copy of Universal Library LabVIEW Extension, you receive a complete set of LabVIEW blocks and example programs. Everything currently supported by Universal Library under Windows is supported by the LabVIEW interface. As new features are added, or as specifications are improved, the LabVIEW support is also.

The examples are of small data acquisition situations wired up in the standard LabVIEW format using the VIs in the Universal Library LabVIEW extensions.

What is LabVIEW?

LabVIEW[™] is a trademark of National Instruments. The program LabVIEW is a graphical programming environment intended to ease construction of custom data acquisition software.

A graphical programming interface allows you to create data acquisition, control, analysis and graphing programs by connecting objects, such as acquisition routines, buttons, displays and transformations in flow diagrams.

Is that easier than programming? Proponents of the method think so, and they make extravagant claims to that effect. When you first use a graphical programming interface, it is very impressive!

For small applications, graphical programming is great. The problem is that as applications grow, the flow diagrams become more complex to view. Many people find these large graphical programs difficult to follow.

Pure graphical programming is interesting, but not a replacement for programming languages. Especially the Windows Visual programming languages in conjunction with SoftWIRE!

Data Acquisition Direct to Excel

Data Acquisition, On-Line Manual, Examples, in fact, everything you need to take measurements directly to cells in Microsoft Excel.

DAS-Wizard

Data acquisition direct to Microsoft Excel worksheets using any Computer-Boards or compatible DAS board for PCI, PC-Card, ISA or PC104.

Automate measurement and control using VBA. Add exciting user interface, graphing and charting integrations with the VIX-Components DAS-Wizard PRO option.

Easy to use single screen interface to I/O and Excel setup.

No data conversion required. Measurements go directly to cells as volts, temperature or A/D counts

Specifications

Full speed data acquisition Data size limited only by Excel spreadsheet size Excel 97, 95 Windows 95,98, NT, 2000

Applications

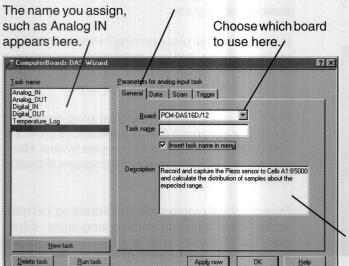
Analog Input/Output
Digital Sensing & Control
Temperature Logging
Laboratory Experiments
Product Test & Verification
Research & Development
Quality Control
Education

Data Acquisition Direct to Microsoft Excel

DAS-Wizard is a an Add-in for Excel that control your ComputerBoards or compatible data acquisition board and places your measurements directly into the cells of an Excel worksheet. A simple dialog box allows you to configure the data acquisition board and set the range of cells to place measurements in.

Surveys repeatedly show that Excel is the preferred software for analysis of measurements. Typing those measurements into a spreadsheet is time consuming and error prone. Writing a conversion program requires programming skills. With DAS-Wizard your measurements go directly to Excel cells in a spreadsheet. The data can be in the format of A/D counts, volts or temperature. A/D counts may be converted into any type of engineering units using the formulas in Excel, which you already know how to use.

One dialog box with 4 tabs is all you need to learn, then you're taking measurements!



Choose a board and a function. Give the function a name and description.

As Easy as ...

DAS-Wizard is easy to use. First choose the type of acquisition or control you want to execute. The choices are:

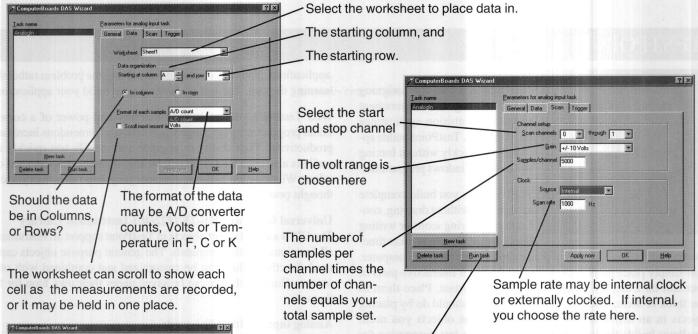
Analog Input or Output Digital Input or Output Temperature Logging

The choices available will be limited to the features available on your data acquisition board.

Give your choice a custom name, provide a description (which can be saved with the spreadsheet) if you want to.

You may provide a complete description of the connection or sensors here.





ComputerBounds DAS World

Talk name

Parameters for analog input task

General Data Soan Trigger

Segres

Segres

External dysts

External dysts

Delete task

Delete task

Delete task

Delete task

Delete task

Delete task

Apply now

DK

Help

This DAS16 supports internal and external triggers. DAS-Wizard shows your choices.

NOW, JUST PUSH THIS BUTTON TO MAKE MEASUREMENTS DIRECT TO EXCEL!

That is all there is to it. You are fully trained to begin making high quality measurements direct to Excel with ComputerBoards measurement hardware and DAS-Wizard.

DAS-Wizard PRO adds VBA ActiveX Controls!

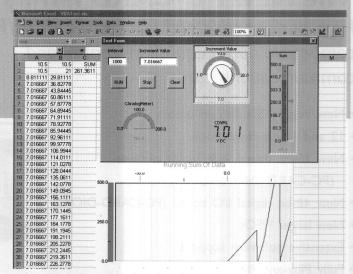
DAS-Wizard PRO includes the complete DAS-Wizard data acquisition to Excel spreadsheets program, plus the VIX-Components ActiveX controls. This exciting combination allows you to create beautiful and instructive control panels, moving strip charts, oscilloscopes and meters. Control panels can have switches, buttons, knobs and sliders, all with programmable limits.

VBA = Visual Basic for Applications

Microsoft has created a Visual Basic back end for all of its office applications, beginning with Office 97. VBA allows you to write programs in easy to use Visual Basic and embed those programs in your spreadsheets, databases and documents. With very little programming required, you can add ActiveX controls directly onto a spreadsheet, like the scrolling strip chart shown here in yellow. You can also open up the VBA development area behind the spreadsheet and create VBA forms, like the control panel shown. The form can be launched by the spreadsheet user with a single mouse click!

Automate Complex DAS and Analysis

Your VBA form or controls on the spreadsheet will activate DAS-Wizard and acquire data. Acquisition parameter can be set programmatically by your user through the control panel you create. Imagine how much value you can deliver to your applications and all on *the* standard in spreadsheets, Excel.



Create control panels and moving charts to liven up your spreadsheet!

Order

DAS-Wizard

Complete Data Acquisition direct to Microsoft Excel DAS-Wizard PRO

Adds VBA ActiveX controls for panels and graphs

TESTPOINT



Description

TestPoint is a tool for designing and developing test, measurement and data acquisition applications for Windows. TestPoint builds applications quickly without forcing you to be a Windows programmer.

TestPoint lets you build complete applications without drawing, connecting or wiring icons or writing lines of code. TestPoint takes time-

proven and intuitive ideas and puts them to work on your computer. You simply place graphs, displays and the other interactive parts of your test on a display panel - order isn't important. Place them as you think of them. Then list the things the test should do by placing objects in an action list. While you select the objects you need, TestPoint builds the code to run the test and a test description for you. Typing is almost eliminated since you can select, drag and drop the variables and parameters needed.

TestPoint objects are designed to match your test requirements for: Instruments, Measurement hardware, Math and logic processing, Graphs, displays and data entry fields. These are just a few of the high-level objects available for your use. TestPoint provides an intuitive editing environment that makes it easy, even fun, to build

applications. You can concentrate on solving the problem rather than learning the tool. There is no faster way to build your application.

With TestPoint you retain the flexibility and power of a conventional programming language while seeing a tremendous increase in productivity. Your ability to upgrade and modify test quickly and easily is also enhanced. You will be able to create, package and distribute Windows test and measurement programs faster than you ever thought possible.

Universal GPIB and RS-232/422/485 Instrument Library

The GPIB and serial port objects in TestPoint support all instruments, all functions and all commands. The general purpose objects can be used directly or they can be customized and combined with other objects. Custom objects can be saved under their own Icon for further use.

Analog inputs with A/D boards

TestPoint provides high-level A/D functions to simplify data acquisition. When the A/D object is placed on the action list, a drop down menu appears. A simple click on the function of choice adds the function to the action list and TestPoint is ready to acquire data.

Analog outputs with D/A boards

TestPoint provides high-speed control of D/A cards for control systems and generation and editing or arbitrary waveforms. Sine, ramp, triangle and square waves are all possible outputs.

The New PC-CARD family

High performance and low cost PCMCIA/PC-CARD compatible data acquisition, control and communications cards.

- New, rugged 50-pin connectors
- 12 and 16-bit resolutions
- New 16-bit board with analog outputs (PC-CARD-DAS16/16-AO)
- New 48-bit digital I/O board (PC-CARD-DIO48)
- New larger FIFOs
- Extensive software support
- · Fully Plug-and-Play







DADiSP

DADISP Makes Complex Data Analysis Faster and Easier

DADiSP is an interactive graphics worksheet -- a visually oriented software package for the display, management, analysis and presentation of scientific and technical data. If you collect, manipulate, edit, reduce, transform, display or analyze data, DADiSP can handle and simplify your data needs. In short, if you work with technical data, DADiSP is for you.

With DADiSP you can acquire, input and even generate sample data, displaying the results in multiple windows for immediate graphic comparison. You can reduce/transform data, using any of hundreds of menu-driven analysis functions, instantly graphing the results of each stage of your work. DADiSP doesn't require mastering any programming skills or arcane command sets. DADiSP is designed to let you perform data analysis the way you think about data analysis.

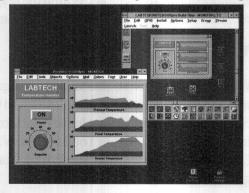
DADiSP's Worksheet Approach Puts an End to Programming A DADiSP worksheet is comprised of as many analysis windows as you need. Each window can contain either raw data, or data transformed by one of DADiSP's many analysis functions, shown as a graph or a table. The data and graphs in each DADiSP window can be related through formulas to those in other windows, permitting you to define your own analysis chain without programming. When new data is loaded into the raw data windows, dependent analysis windows automatically recalculate and update, graphically.

LABTECH NOTEBOOK

LABTECH® NOTEBOOK™, the industry standard for real-time data acquisition and control, turns your PC into a powerful data acquisition and control system, allowing you to collect data, perform real-time analysis, and control your system. NOTEBOOK is designed so that no programming is necessary, and the emphasis is on allowing

the user to get any application up and running quickly.

NOTEBOOK's process monitoring capabilities give the flexibility to configure applications with a variety of sampling rates and sensor types. Sampling rates from hundreds



of thousands of points per second to a few points per hour or day may be scheduled. Each I/O point may have its own sampling rate and trigger conditions, yet global changes are fully supported in the Windows versions. Triggers for any I/O point may come from analog, digital, calculated values, keyboard or mouse input.

NOTEBOOK fully supports all Computer Boards I/O hardware, including a vast array of hardware devices for analog and digital input and output, as well as devices designed for specific purposes, like thermocouples, RTDs, and strain gages.

DADISP Brings Your Data to Life... Graphically

DADiSP enables you to look at your data from different points of view. View data as a line graph, a scatter plot, a stick chart, a bar chart, a waterfall plot, a 3-D plot, 4-D colonization or as a basic table of numbers. With DADiSP, you can dynamically scroll, expand or compress your data in any direction. Zoom in on a region of interest, add grids, include scales and engineering units. Comparing different views of your data couldn't be easier.

Powerful Enough to Meet All Your Needs

From data input and acquisition, to analysis and display, to reduction and manipulation, to transformation and what-if simulations, to publication-quality output for journals, reports and presentations. DADiSP does it all! DADiSP gives you high quality graphics and text output on a wide variety of printers and plotters or transfer the DADiSP window or worksheet into your favorite desktop publishing package.

Capture Data From Any Source

DADiSP automatically captures data generated by most laboratory instruments and test and measurement equipment, making your data available for immediate graphic display and analysis.

Let DADiSP help you take control of automated test and measurement equipment, or even production equipment. DADiSP is ideal for quality management and factory monitoring applications.

SNAP-MASTER

Snap-MasterTM defines a new generation of data acquisition, analysis, and control software. From its extensive feature list to its innovative flow-chart instrument, Snap-Master is a powerful software solution. If you don't want to write, compile and debug code, you can still acquire, analyze, display, and store your data in minutes!

Snap-Master has an open architecture that allows the user to extend the capabilities of the standard software. Whether you are a system integrator, OEM, or an end user, Snap-Master is the total data acquisition software solution. From the power in its standard modules to the ability to add new capabilities through the open architecture, Snap-Master is a powerful and adaptable platform to meet your data acquisition, analysis, control, and display needs.

Save Time And Money

Snap-Master saves engineers and scientists valuable time by making it easy to access all of its power. Creating a custom instrument is simple with Snap-Master's intuitive flowchart user interface, avoiding the "icon overload" of other packages. Use Snap-Master to replace standalone equipment such as a digital storage oscilloscope, stripchart recorder, PID controller, frequency spectrum analyzer, or waveform generator. You could even create your own "super instrument" by customizing your test setup, graphical displays, and presentation of the packages. Snap-Master even saves you money by allowing you to purchase only the options you need: data acquisi-

by allowing you to purchase only the options you need: data acquisition, time domain analysis, and frequency domain analysis.

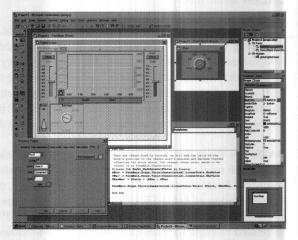


VIX Components— Virtual Instrumentation Software Tools

Virtual Instrumentation is the software representation of traditional and exciting new measurement instruments on a personal computer. With virtual instrumentation software tools and a data acquisition board you can construct a custom instrument. Your

virtual instrument will have the controls and displays you want to see and use. It will accept the ranges you choose and will analyze measurement data in the manner you prescribe. No wonder Virtual Instrumentation has swept the measurement world by storm!

To create a virtual instrument you need easy-to-use software tools. Virtual Instrumentation tools should have the visual and control aspects you need and be simple to integrate with hardware and other software such as browsers, spread sheets, Visual Basic programs, and C/C++ programs. One set of tools should work in all environments uniformly. ComputerBoards' VIX Components 32-bit and 16-bit components do all this and more, bundled together into one product that combines the best of the programming and ActiveX control environments.



VIX Components includes both 32-bit for Win95/98/2000/NT and 16-bit for Win3.x

VIX 32-bit support

32-bit Virtual Instrumentation ActiveX Graphical Controls and Dynamic Link Libraries for Display, Analysis, and Control.

Specifications

32-bit Architecture

Visual C/C++, Visual Basic 5.x or greater, Visual Basic for Applications, ANY ActiveX Container such as WEB pages, LabVIEW, HP VEE, and other modern software programs.

VIX Components Features

VIX-Components is the newest virtual instrumentation software tool kit. It captures the best visual aspects of earlier OCX and VBX virtual instrumentation software tools in a new paradigm: AcitveX. This means that you learn how to use an object in one environment, and that knowledge is applicable to all. If you learn to use a Bar Meter in Visual Basic, it is the same object and exhibits the same behavior in C++, Visual Basic For Applications and on a WEB page using JAVA or VB Script.

On Line Documentation, Help, and Examples

An extensive set of context sensitive help documents provide complete information on methods, events, and functions. Graphics showing the locations of user programmable features within the Active X controls are located in the help file along with easy-to-understand explanations. Within the help file are example programs that you can cut and paste to your application.

VI 16-bit support

Windows 3.x and its programming languages are widely used still, and it is important for you to know that ComputerBoards continues to support all your legacy platforms. 16-bit Virtual Instrumentation Software Tools include VBX and Dynamic Link Libraries for Graphics, Analysis & Control

Specifications

16-bit architecture for Windows 3.x and 16-bit programming languages. Includes VBX controls and a DLL with functions that may be programmed to create graphics, analyze data, and implement real-time control.

Programming in Visual Basic 6.0 or greater? You'll want to take advantage of the power of SoftWIRE. Please see pages 6-10 of this catalog or visit our web site at: www.computerboards.com/softwire

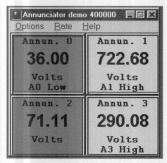
	.\/:4.		Instrumentation	Caffe	
Barmeter	X	x,a	Inverse FFT	A	a
Circular knob	X	x,a	Magnitude of Harmonic	Α	a
Digital meter	X	x,a	Power Spectrum	A	a
LED	X	x,a	Convolution	A	a
Oscilloscope	X	x,a	Correlation	A	a
Scrolling strip chart	X	x,a	FIR Filters (Real time)		
Slideswitch	X	x,a	Low-pass	X	a
Slider control	X	x,a	High-pass	X	a
Spin bar		x,a	Band-pass	X	a
Toggle switch	X	x,a	Band-stop	X	a
XYChart	X	x,a	Coefficients &	X	a
XYPlot		x,a	Response	X	a
			Integration		
Pata analysis and manipulation:			Any array using extended	Α	a
Calculation			trapezoidal and Simpson's	Α	a
Z=(A,Y) Op (BX+C)		a	Matrix		
Calibration			Addition	Α	a
Y = AY + B		a	Subtraction	Α	a
Complex Numbers			Multiplication	Α	a
(Two Arrays)	A	a	Transpose	Α	a
Additon	A	a	Determinant	Α	a
Subtraction	A	a	Inverse	Α	a
Division	A	a	Signal Generation		
Multiplication	A	a	Sine		a
Rect. to Polar	A	a	Pulse		a
Curve Fit			Triangular		a
Linear	A	a	Sawtooth		a
Polynomial	A	a	Smoothing filters		
Derivative			Moving average &		a
Digital Windows			Median		a
Blackman	A	a	Statistics		
Hamming	A	a	Mean	Α	a
Welch	A	a	Standard Deviation	Α	a
Hanning	A	a	Variance	A	a
Bartlett	A	a	Absolute Deviation	A	a
Parzen	A	a	Real time control:	7.7	-
Rectangular	A	a	Alarms with four setpoints		a
			Proportional Integral/Derivative		a
X = 32 bit ActiveX, A	- 32 bit A PI		1		
x = 32 bit ActiveA, A x = 16 bit VBX, $a = 1$					

GUI Objects

Input controls like circular knobs and sliders allow you to interact and change the value of a variable. Output controls like analog meters, bar meters, strip charts etc. are used to display the value of a variable in a graphical format that is easier to interpret and use. Any control can be printed, saved as a bitmap or copied to the clipboard. Here is a brief description of the GUI controls.

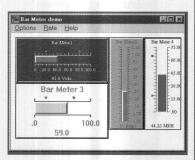
Analog meter: These display a value by positioning a needle along a circular scale. You can specify the size, diameter, number of needles and their type, arc and color of the meter. In addition, the meter's scale can be divided into three separate colored regions to represent low alarm, normal and high alarm ranges.





Annunciator: An annunciator is used to display the current value and alarm status of data in text form. Typically, an application would have a matrix of these annunciators in which each would be monitoring a variable. Specify the label of each annunciator and the unit of the monitored variable as well as the color for the annunciator and the text message to be displayed when a low alarm, normal and high alarm condition is detected.

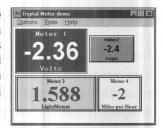
Bar meter: A bar meter displays a value by changing the size of a bar. The bar can be chosen to be either vertical or horizontal and have a scale with tick marks Specify the range of the scale and the number of ticks. The bar can be set to change its color when the variable falls below a low alarm point, or is in the normal operating region or exceeds a high alarm point.





Circular knob: A circular knob is an input control which changes the value of some variable. You can specify the color of the knob, the circular arc over which it should move and the range for the input. The circular knob can be rotated by clicking on it and then moving the mouse. This control notifies the application program by sending messages about the increase or decrease in value.

Digital meter: A digital meter is used to display the exact value of a variable in numeric format. The library functions allow you to specify the size, color and label of the meter and the unit of the variable. Additionally, the color and font for the display can be selected.



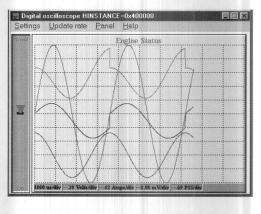
LED: An LED can change color if the value of a variable is above or below a specified threshold. When the value is below the threshold, the LED is off and is



displayed your choice of 'off' color. When above, it changes to your 'on' color. LEDs may be square or round and respond to mouse clicks to perform as push button switches.

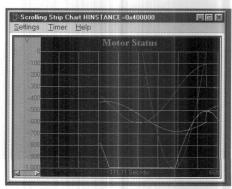
Oscilloscope: The oscilloscope displays the values of one or more variables (or channels) as waveforms which change over time. The vertical axis is used to depict the amplitude of the waveform and the horizontal axis for the period. Specify the size of the display, its background color, colors for all the monitored channels, color and line types for the axes and grids and many other visual attributes. The waveforms are displayed starting at the left edge of the display and

progressing to the right. When the right edge is reached, the display is cleared and the waveform starts all over again from the left edge. The oscilloscope also has options for triggering and displays the values of the waveforms when the mouse is clicked in the plot.



Scrolling strip chart: A strip chart provides all the features of the oscilloscope but the waveforms are scrolled from the right to the left as they change over time. Therefore at any instant, the oldest values are to the left edge of the display and the most recent values are at the right

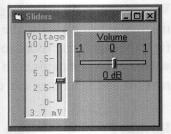
edge of the display. You can choose several visual attributes of the scrolling strip chart. This control has an important property in that it stores data in an internal buffer. You can specify the size of this buffer and historical data can be replayed as desired.



Virtual Instrumentation Software Tools

Slider control & Slide switch: A slider control is a scroll bar used to change the value of a variable. Specify the color of the control, the scale

over which it should move and the range for the input. The thumb tack in the slider can be moved by clicking on it and then moving the mouse. This control notifies the application program by sending messages about the increase or decrease in value. A slider switch is limited to discrete positions, like 1, 2, 3...

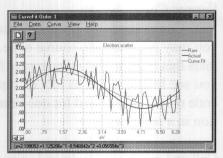


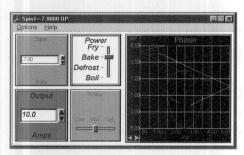
Spin bar: Spin bars have an edit line with an up and down arrow to the right. Entering a value in the edit line sends the value to your program (values may be validated). Pressing the arrows will increment or decrement the value in the edit area. There is not a spin bar control in the 32 bit ActiveX control group because VB5 added the spin bar as a standard control.



Toggle switch: A toggle switch is an input control which is used to change the value of some variable from ON to OFF or vice versa. Like the other controls, various visual attributes of the switch can be selected by the program. This control notifies the application program by sending messages when the operator clicks on the switch and toggles it.

XY Chart: An XY Chart displays a set of Y values plotted against a common X axis. You can specify the Y scale of each data set and the extent of the X axis. Choose the font, grid type, line type, background color and much more. Add legends and markers.

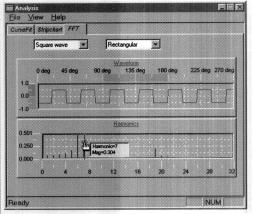




XY Plot: This a dynamic display of sets of X and Y values. Specify the X and Y scales of each data set and several visual properties.

Programming Considerations

All of the GUI controls are implemented as custom controls which extend the set of standard controls available in Windows and ease application development tremendously. Like standard controls, these custom controls are simply child windows dedicated to a single purpose. A custom control communicates with the operator, the application program, and the system. The control's visual describes



the complete operator interface, while the control's messages and exported functions make upits API. Applications can communicate with the control by calling its API functions or sending it messages.

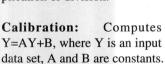
sages. In addition, applications can also use any of the Windows API functions to manipulate the custom controls. This allows you to customize any aspect of the control using standard Windows techniques including subclassing.

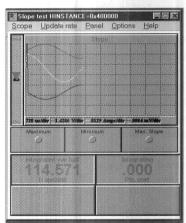
Data Analysis and Manipulation Functions

VIX-COMponents for Programmers enables the application developer to perform sophisticated analysis on data being col-

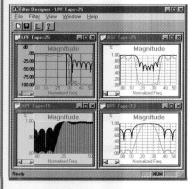
lected. The analysis is performed in real-time with minimum overhead. A brief description of each of the data analysis functions is given here.

Calculation: Calculates Z = (AY) operation (BX+C), where Z is the output data set, X and Y are input data sets, A, B and C are constants. The operation can be addition, subtraction, multiplication or division.





Complex Number: Add, subtract, multiply and divide complex numbers.

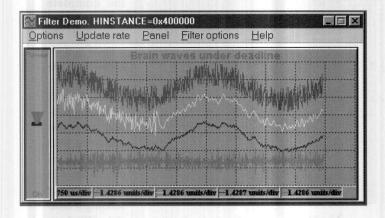


Curve Fit: Perform linear and polynomial curve fit on a set of data

Derivative: Finds the derivative of an input data set in real time. You can select the number of data points used in the computation.

Digital Window: Reduce spectral leakage in FFT calculations and design FIR fil-

ters using Blackman, Hamming, Welch, Hanning, Bartlett, Parzen and Rectangular windows.



DSP: Calculates the FFT of real data, magnitudes of any specified harmonic and the inverse FFT.

Filters: Design and implement FIR and IIR digital filters.

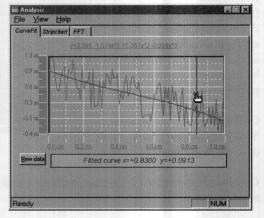
Integration: Computes the integral of a given data set using the extended trapezoidal rule and extended Simpson's rule.

Interpolation: Perform polynomial interpolation and extrapolation.

Matrix Operations: Add, subtract and multiply matrices. Compute the transpose, determinant and inverse of a matrix.

Signal Generation: Generate sine, pulse, triangular and sawtooth waveforms of any period and duty cycle.

Smoothing filters: Eliminates noise from a given data set using moving average, median and Savitzky-Golay filters. You



can select various options for these filters.

Statistics: Determines the mean, standard deviation, variance and mean absolute deviation of a given data set.

Real-Time Control Functions

The 16 bit API has functions to test for alarms and PID loops. Each operates in real-time and is based on the timer you select.

Alarms: Monitor up to four alarm thresholds and hysteresis.

PID: Proportional control based on linear or nonlinear functions.

MORE ACTIVE X ON THE WAY!

We are aggressively adding to the ActiveX group. All of the math functions in the API, as well as many new functions are being added to VIX-Components. Check our www.computerboards.com site to find out about the current list and what they can do for you.

Royalty Free Distribution

Programs written with VIX-Components may be distributed royalty free. VIX-Components is based on several binary files which must be present on each CPU running a program written with the components. When you purchase VI-Components, your license is for use on one CPU at a time. For a one time charge you may purchase the license to make unlimited copies of the binary files for distribution with your application program.

Simply order part number VI-COMPONENTS-RUN. You will receive a distributable copy of the necessary files and a license agreement. From then on you may distribute your application royalty free.

Source Code License

VIX-Components is written in C and C++ using MFC and you may purchase the source code. For expert programmers this is an opportunity to save hours developing what you see here, as well as lots of supporting code. Source code may be purchased for one time use, or for redistribution in a product.

Call and ask for the technical sales manager for specifics. Sale of source code is restricted to noncompetitive applications and entities

ORDERING GUIDE

VIX-COMPONENTS

ActiveX, VBX and Dynamic Link Libraries Ships on CD-ROM with card to request 3.5" floppy

VIX-COMPONENTS-RUN

Run time license for unlimited distribution of applications.

VIX-COMPONENTS-SRC

Source code in C. Call for ordering & license form.

Universal Library™

Data Acquisition & Control Programming Tools

Programming Tools Are Important

ComputerBoards' research and polls by major magazines show that most modern data acquisition and control applications software is

written by you. You have the skills to write clean, efficient code that does exactly what you want. Code you control. Code you control. Code you can freely distribute without paying fees.

Sure, writing software is costly, and so is buying, learning and using



someone else's software package. What 80% of data acquisition customers know is that it usually costs less overall to build your applications using modern programming environments like Visual Basic 5, or Visual C++. When you consider the number of Active X components available for the time consuming and difficult tasks of user interface and data presentation, and the ease with which the measurement portion of the program is written using Universal Library, it is no wonder that there is such an overwhelming preference for writing code.

ComputerBoards is proud to introduce release 5 of the Universal Library, a complete set of I/O libraries and drivers for all our boards for all Windows and DOS languages, and graphical programming environments like HP VEE and LabVIEW.

With Universal Library you can work in:

Win/NT/200	00Win/98/95	Win3.x	Win/CE	DOS	Qnx
C	C	C	C	C	C
C++	C++	C++	C++	QC	Call
VB	VB	VB	VB	QB	
Delphi	Delphi	Delphi		TurboC	

Many others! Call if you don't see your favorite here.

From Leading Edge to Legacy

You want to work with the newest platforms; Windows NT & 2000, Windows 95/98, QNX, Linux and others. You also have to maintain those solid legacy applications running on DOS and Windows 3.x. We know you are concerned about leading edge applications *and* legacy code. Universal Library is constantly expanding, adding leading edge tools *and* improving legacy libraries.

Universal Library comes to you on one CD-ROM, which contains 2 distinct libraries. One 32-bit library for Windows 95, 98, NT & 2000, and one 16-bit library for Windows 3.x and DOS.

Easy to Use, Maintain and Expand

Universal Library is easy to use. It is written from the programmers perspective. Simple data acquisition operations such as making an analog reading, or a series of them, are treated as a single operation.

Universal Library is easy to maintain. The syntax is constant from board to board, and to a great extent from language to language. It is easy to use the same code with different boards and different platforms.

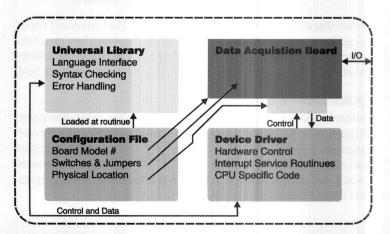
Universal Library is easy to expand. The personal computer is evolving constantly. Today the exciting news is PCI, compact PCI, Windows 2000 and many other new developments. Here is some good news. Those Universal Library lines of code you wrote for Windows 3.x will run on the newest platforms and support the newest boards without modification! Universal Library was designed to protect your investment in software.

A Logical Structure

Which is the most accepted and logical structure for software which controls I/O hardware? Open the Windows control panel and examine the way your computer is configured. Certain aspects of the hardware are "configured" infrequently. They are assumed to remain relatively constant. In fact, programs depend on it. Other aspects of hardware change as work is done. Your modem is a simple example. Much of it is "configured", then when software uses the modem, those configuration setting allow the software to be written to accept those setting greatly simplifying the code. Data flows through the modem under control of the software.

Universal Library uses the same logical structure. A configuration utility, *Insta*Cal, maintains all the parameters that are not likely or desirable to change under program control. The configuration information is stored in a configuration file that Universal Library reads when loading. It is this logical structure that gives you the freedom to switch boards without having to rewrite code.

Here is a diagram that explains the structure.



Universal Library

Universal means Easy to Learn & Use

Universal means board to board the syntax for functions, such as an analog input, are the same. From CIO-DAS08 to PCI-DAS1602 the programming syntax is the same. In addition, the Universal Library is intelligent. It knows about individual boards and their capabilities. Ask for something the board can't do, and a warning message supplies the information you need to correct the program.

Universal means language to language the syntax structure remains constant. The functions and features remain constant. The intelligent capability parser remains constant. Want to change programming languages? The Universal Library requires no relearning. Moving from DOS to Windows? The Universal Library code moves with you.

What about advanced features?

I/O boards do differ in features. Resolution, maximum speed, transfer methods, channel strategy and gain coding all may change from board to board, affecting price and performance.

Lets take a look at 2 boards which use the function cbAIn Scan(). In each example we will use the maximum A/D rate for the board.

'C' Example

FEATURE	PCI-DAS1602	CIO-DAS16M
Speed	330 kHz	1 MHz
XFR Method	RepInSW.	RepInSW
Gain	Programmable	Programmable

For the PCI-DAS1602/12:

For the CIO-DAS16M1

Notice that the transfer method is not specified. The Universal Library is intelligent and applies board specific strategies which best match the requirements of the acquisition. You may allow the Universal Library to select the transfer method or you may specify it in the Options field.

Quick Basic Example

Before looking at the Quick Basic for DOS code, lets cover a few points skipped in the 'C' example above. First, there are header files for each language which contain descriptions of boards and other system variables. The library reads a configuration file which identifies boards, switch and jumper settings and accessories attached. The configuration file is created by the $InstaCal^{TM}$.

'\$INCLUDE: 'CB.BI' 'Mandatory include file 'SSTATIC DIM DataBuffer%(Count&) BoardNum = 0'Use board 0 LowChan% = 0'First channel HighChan% = 1 'Last channel 'Number of points to collect Count& = 50Rate&=10'Rate = 10 samples/sec 'DAS08 not prog. gain Gain% = BIP5VOLTS 'Return 12 bit values Options% = CONVERTDATA

ULStat = cbAInScan% (BoardNum, LowChan%, HighChan%, Count&, Rate&, Gain%, DataBuffer%(0), Options%)

Note that cbAInScan and variable values are alike for the QuickBasic and 'C' examples. Differences in the example are limited to non-Universal Library statements. Once you learn Universal Library for one language, your knowledge is easily transferred to other languages, and, you can communicate effectively with people who program in languages other than your favorite.

Oh, by the way, you do not have to change a line of code to change from one board to the next. Simply run *Insta*CalTM to assign a new board to the board number your program references. *Insta*CalTM modifies the configuration file which is read by the standard header file. The Universal Library will apply only those features to the board which match the capabilities of the board.

FUNCTIONS

The Universal Library is built upon individual functions, each of which programs, triggers, reads from or writes to a boards I/O components.

I/O board functions may be grouped into:

ANALOGI/O

cbAin()	Single analog input.
cbAinScan()	Input from ChLo to ChHi N times at R rate.
cbALoadQueue()	Load channel/gain queue.
cbAOut()	Single analog output.
cbAoutScan()	Output from ChLo to ChHi N times at R rate.
cbAPreTrig()	Set pretrigger buffer and scan values.
cbATrig()	Analog trigger setup.
cbAFileAinScan()	Analog input direct to file.
cbFilePreTrig()	Pre-triggered analog input to a file.
cbAConvertData()	Converts analog input to channel/data format.
cbAConvertPretrigD	ata() Unload & convert pretrigger data.
cbGetStatus()	Return status of a background operation.
cbStopBackground()	Halt a background process.

THERMOCOUPLE INPUT

cbTIn()	Inputs, Smooths, compensates & linearizes TC
cbTInScan()	Same for a range of Thermocouples.
COUNTER	
-LC0251C	Calast assets as and in a sea de fee 92054 -1:

Select counter operating mode for 82C54 chips.
Select operating mode for Z8536 chips.
Set options for Z8536 chips.
Select operating mode for 9513 chips.
Set options for 9513 chips.
Measure frequency using counters.
Read counter.
Load counter value.
Store counter value on interrupt.

Universal Library

DIGITALI/O

cbDBitIn() Inp cbDBitOut() Ou

Input a single digital bit..
Output a single digital bit.

cbDConfigPort()
cbDIn()

Configure one port for input or output.

Input a single 8 bit port.

cbDInScan()
cbDOut()

Reads N bytes at R rate from one port.

Output a single 8 bit port.

cbDOutScan() Outputs N bytes at R rate to one port.

MEGA-FIFOMEMORY INPUT/OUTPUT FUNCTIONS

cbMemSetDTMode() cbMemReset() cbMemRead() cbMemWrite() cbMemReadPretrig() Set direction of DT-Connect transfer. Reset M-FIFO memory to start address. Read data from M-FIFO to data array. Write from data array to M-FIFO memory. Read & organize pre-trigger data from M-F.

STREAMER FILE FUNCTIONS

cbFileAinScan()	Transfer analog input directly to streamer file.
cbFilePreTrig()	Use pretrigger strategy to streamer file.
cbFileGetInfo()	Reads acquisition parameters from streamer file
cbFileRead()	Reads N data points into array from file.

ERROR HANDLING FUNCTIONS

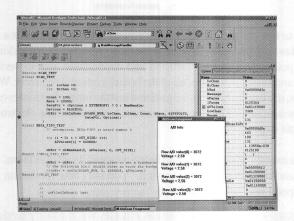
cbErrHandling()	Selects from several types of error handling.
cbGetErrMsg()	Converts error codes into English messages.

Error handling has several options both for error trapping and error reporting. Reporting may be set to none, warnings only, fatal only or all. Errors may halt program execution or allow it to continue. Error messages are numerical, and may be converted into verbose English statements which provide a clear explanation of the error's cause.

An extensive feature glossary within the Universal Library checks board features against program requests, and traps requests which the boards cannot match. For example, if you are programming a CIO-DAS08 and request a transfer of 50 kHz, the Library will trap that error and provide advice that the board is not capable of that rate. The feature glossary will greatly assist in preventing you from writing a program which attempts things the board is not capable of. This will save you hours of debug and possibly prevent you from puzzling over bad data!

EXTENSIVE EXAMPLES INCLUDED

A complete set of example programs is included with Universal Library. Examples for Visual Basic, Cand PASCAL for both Windows and DOS languages clarify the use of each Universal Library function.



Comparing Libraries

When you chose a data acquisition board vendor you examine specifications such as speed and accuracy. Once you have the hardware that will do the job reliably, software choices need to be made. Reliability, ease of use, long term commitment are three of the important features to be considered.

Reliability

Universal Library has been in use since 1990. In that time over 250,000 data acquisition boards have been programmed to acquire mission critical data, control factories, experiments and product test stations with Universal Library software. That the Library is only now on its fifth majorrevision says a lot for the rigorous testing each upgrade receives before release.

Before you select a library, ask to see what a copy of that library looked like 5 years ago. Ask which hardware available 5 years ago is no longer supported. Ask which new environments and features of current library do not support 5 year old hardware. Ask yourself where you want your application to be in 5 years. Our customers tell us that measurement systems, once constructed and installed, tend to persist for many years.

Ease Of Use

Universal Library was designed with you in mind. Whenever a software package is written, trade-offs are made between ease of use and ease of creation. Universal Library is uncompromising in design; it is always made easier for you to use, which makes it harder for us to write.

Take a look at how many steps are required to make an analog reading. With Universal Library there is one line of code. Other libraries might take many lines of code. The difference lies in the internal structure of the library. Other libraries might make you set up your own timing and transfer operations. Universal Library does all that for you. All the little details are handled by the library internally.

Before you purchase a board and software, look at the code for simplicity and ease of use. It will translate into real savings now, as you write code, and later, as you maintain it.

Long Term Commitment

Universal Library currently supports all the hardware products sold by ComputerBoards, and every platform from DOS to Windows 2000. Programs written in the earliest versions will run in revision 5 without changes. We will continue to provide reliable, easy to use software support that protects your investment in measurement and control.

ORDER

UNIVERSAL -LIB/CD

WinNT/2000/98/95/3x/DOS programming library on CDROM

UNIVERSAL-LIB/1.4M

WinNT/2000/98/95/3x/DOS programming library on 3.5 inch floppies

*Insta*Cal™

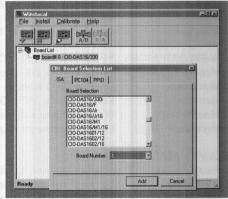
Data Acquisition Board Installation, Calibration and Test

Easy to Use Installation, Calibration and Testing

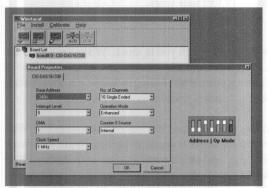
InstaCal is a comprehensive software program that manages everything about your data acquisition hardware. When you plug in a plug-and-play board, such as a PCI or PC-Card DAS1600, InstaCal detects the hardware and assigns resources automatically. You may set special features of the board so your software programs will run as you wish. All the settings are stored in the ComputerBoards configuration file.

Once your board is installed, you may want to check calibration. *Insta*Cal walks you through a professional calibration procedure tailored to the board you own.

Have doubts about a function? *Insta*Cal will test the board both internally and externally giving you complete confidence in the board's operation. If a problem is found, it is clearly identified and a detailed report is generated which will speed a complete repair.



InstaCal supplies Installation, Calibration and Test for EVERY BOARD we've ever made!



Installation is automatic for Plug & Play boards, and easy for legacy boards with step by step help.

Installation

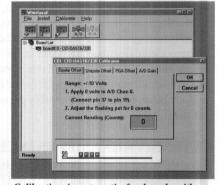
Installation of a ComputerBoards data acquisition board is a snap with the new PCI and PC-Card, Plug & Play standards. Just install the hardware and let the operating system do the rest. It is that easy! Gone are the days of setting switches and jumpers. Now you are ready to select the special features of the board that control your measurements. Everything else will be taken care of by the data acquisition program you use.

For legacy systems such as Windows 3.x or for ISA and PC104 boards, you need to set those switches and jumpers then configure the software to recognize your board. InstaCal will take you right through that process with diagrams of switches and lots of helpful suggestions for avoiding conflicts.

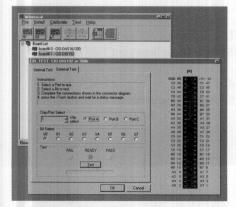
Calibration

All of ComputerBoards' PCI, CPCI and PCMCIA data acquisition boards come with software auto calibration. Special circuitry and precision references on the board allow software to complete a calibration cycle without intervention on your part. Calibration is as easy as choosing the Calibrate icon in InstaCal menu bar, and starting a calibration cycle.

Here we've shown you a picture of how easy it is to calibrate a ISA or PC/104 board which has potentiometers. Each potentiometer is shown with instructions for connecting a calibration signal and adjusting the potentiometer. The reading is shown in real time so you know when the board is calibrated!



Calibration is automatic for boards with software calibration, and easy for boards with potentiometers.



Simple to use, full function tests.

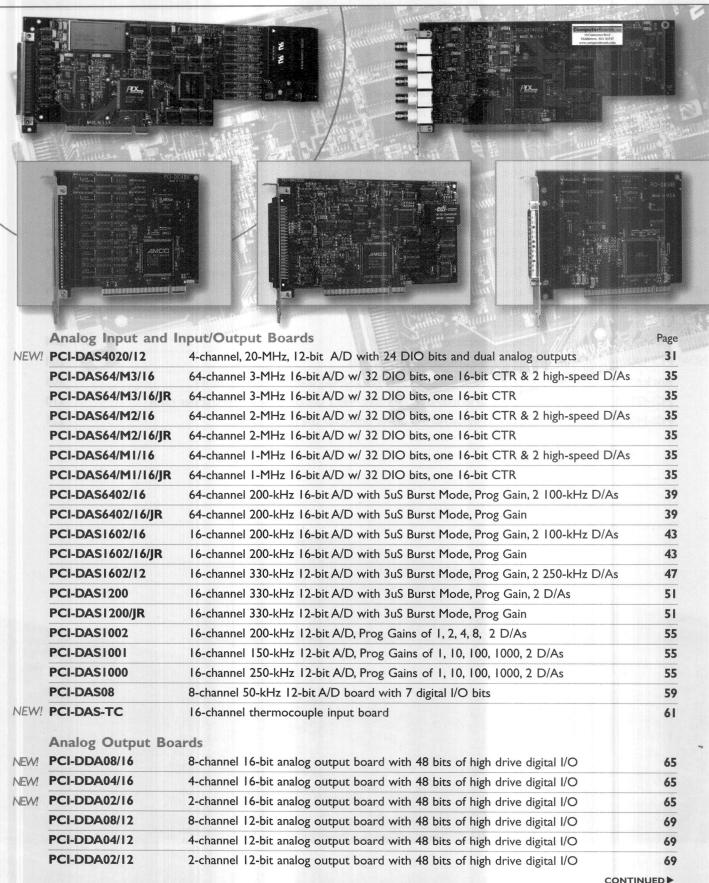
Tes

From time to time, we all want to test our measurement instruments. Maybe we doubt a reading, or the values displayed by our favorite program, or even if the code we are writing is doing what we want it to. With *Insta*Cal you have a factory certified and dependable way to verify those readings. Click on the Test icon and *Insta*Cal will test all of the board's internal registers. When you are satisfied with those functions, it is time to hook up a signal and test the input electronics or control electronics. *Insta*Cal draws you a picture of the signals to connect, stimulates the electronics and gives you a reading that you can depend on.

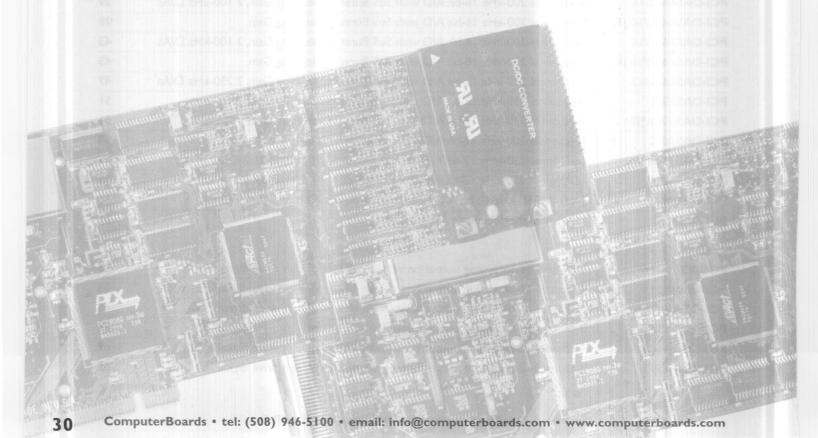
Problems? *Insta*Cal will tell you exactly what they are and help you speedily resolve them. A report identifies the possible sources and suggests corrective action. You may take the action yourself or you may use that report to speed your way through our factory repair process.

One copy of *Insta*Cal comes FREE with every order!

Data Acquisition & Control for the PCI Bus

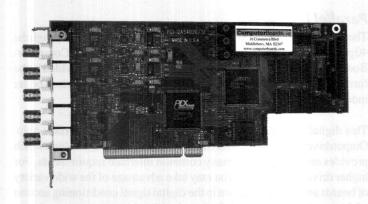


	PCI-DIO48H/CTR15	48-bit, High Drive (64mA) digital I/O with 15 16-bit counters	82
NEW!	PCI-DUAL-AC5	CI-DUAL-AC5 Dual PB-25 solid state I/O module interface for the PCI bus	
	PCI-PDISO16	16 Electromechanical relays, 16 isolated (500V) digital input board for the PCI bus	87
	PCI-PDISO8	8 Electromechanical relays, 8 isolated (500V) digital input board for the PCI bus	87
NEW!	PCI-QUAD04	4-channel quadrature encoder interface board	89
	Other PCI Bus Pro	oducts	
NEW!	PCI-COM232 series	RS-232 boards for the PCI bus	204
NEW!	PCI-COM422/485	RS-422/485 boards for the PCI bus	204
	RocketPort	High-speed 4, 8 and 16 port RS-232/485 boards and accessories	203
	PCI-GPIB	PCI bus GPIB interface, fully IEEE-488.2 compliant, >1 MHz transfer rates	210
	PCI-MDB64	MetraBus Industrial I/O driver board for the PCI bus	221



PCI-DAS4020/12

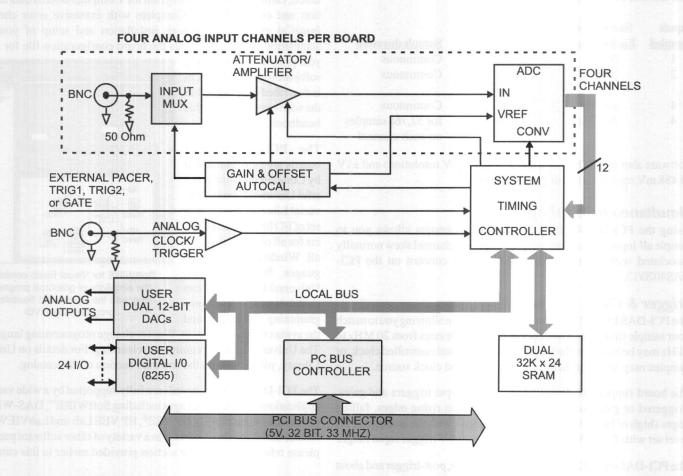
Ultra High-Speed PCI-bus Compatible, 4-Channel, 12-Bit Analog Input Board with Dual Analog Output Channels & 24 Digital I/O bits



Features

- 20 MHz sample rate
- 12-bit A/D resolution
- 4 input channels
- Software selectable input ranges
- One A/D per channel
- Bus-master & Scatter-gather capable
- Dual 12-bit D/As
- · Analog and digital triggering
- 24-bits digital I/O
- Fully Plug-and-Play
- Fully Autocalibrating

Block Diagram



Functional Description

The PCI-DAS4020/12 is an ultra high speed, analog input board for PCI bus computers. Offering four 12-bit analog inputs with sample rates up to 20 MHz, 24 bits of digital I/O and two 12-bit analog outputs.

At the heart of the board is a powerful System Timing Controller (STC) chip. The STC chip controls all A/D sampling as well as controlling the 64Ksample A/D FIFO. This functionality is based on the STC chip's use of an on-board 32K x 24 SRAM. The board provides bus-mastering and scatter-gather functionality to assure the desired system timing is maintained.

The PCI-DAS4020/12 is completely plug-and-play. There are no switches, jumpers or potentiometers on the board. All board addresses, interrupt channels etc. are set by your computer's plug-and-play software. Even calibration is performed via software by using on-board digital potentiometers and trim D/A converters.

Analog Inputs

The PCI-DAS4020/12 provides four 12-bit analog inputs. These inputs as well as the trigger input are provided at standard BNC connectors. Each channel on the board offers a 20 MHz maximum sample rate. PCI bus bandwidth limits data transfer to 80 MByte per second. Since each 12-bit sample requires two bytes the board's total aggregate sample rate is limited to 40 MHz. However, data may be written at full speed into the board's large 128 kSample buffer memory. The table below shows the data transfer limitations of the board.

Inputs sampled	Sample Rate Each Channel	Total Board Sample rate	Sample duration
1	20MHz	20MHz	Continuous
2	20 MHz	40MHz	Continuous
4	10MHz	40MHz	Continuous
4	20 MHz	80MHz	for 32,768 samples on each channel

Software also selects between the $\pm 5V$ (2.44 mV resolution) and $\pm 1V$ (0.488 mV resolution) analog input ranges.

Simultaneous Sampling

Using the PCI-DAS4020/12's four A/D converters allows you to sample all inputs simultaneously. Channel-to-channel skew normally associated with a multiplexed A/D is not a concern on the PCI-DAS4020/12.

Trigger & Clock Modes

The PCI-DAS4020/12 provides great flexibility in allowing you to match your sample timing to your application. Sample rates from 20 MHz to 2 kHz may be based on the board's internal crystal controlled clock or samples may be syncronized to a user supplied clock source.

The board supports both analog and digital input triggers and gates. Triggered or gated sampling may be based on rising edges, falling edges (high or low levels for gated operation) with the analog trigger level set with 2.44 mV resolution within the ±5 V trigger input range.

The PCI-DAS4020/12 also supports pre-trigger, post-trigger and about trigger modes.

Analog Outputs

The PCI-DAS4020/12 provides two channels of 12-bit analog output. Software selectable output ranges of $\pm 10 \text{V}$ and $\pm 5 \text{V}$ are provided, and channels may be set at different ranges. The D/A outputs drive up to $\pm 5 \, \text{mA}$, are short circuit protected (25 mA limit) and are cleared to 0 volts on power up or reset. The analog outputs are controlled via programmed I/O commands. On power up or system reset both analog outputs are cleared to 0 Volts.

Parallel Digital I/O

The PCI-DAS4020/12 provides 24 bits of parallel, digital I/O through the 40 pin auxilliary connector. This port is pin compatible with Computer-Boards popular DIO-24 series boards. The digital I/O is provided in the form of two 8-bit ports, and two 4-bit ports. Each of the ports to be set independently as input or output.

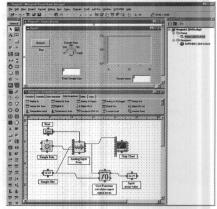
This digital capability is based on the popular 82C55 interface chip. Output drive capability is 2.5 mA at 0.5 V max or 2.5 mA at 2.0 V min which provides enough drive for many common interface requirements. For higher drive requirements you may take advantage of the wide variety of boards and products shown in the digital signal conditioning section of this catalog. All ports default to the input state on power up/reset.

Software

All PCI-DAS4020/12 boards come complete with ComputerBoards' powerful *Insta*CalTM software package. *Insta*Cal is a complete installation, calibration and test program for ComputerBoards data acquisition and control boards. Complete with extensive error checking, *Insta*Cal guides you through installation and setup of your data acquisition board and creates the board configuration file for use by

your program or application software package. *Insta*Cal is described in detail within the software section of this handbook.

The PCI-DAS4020/12 boards are fully supported by ComputerBoards' powerful Universal Library. Universal Library is a complete set of I/O libraries and drivers for all of our boards, for all Windows based languages. When using the Universal Library you can switch boards or even programming languages and



SoftWIRE for Visual Basic combines the simplicity of graphical programming with the power and flexibility of programming in VB!

the syntax remains constant. Want to change programming languages? The UniversalLibrary requires no relearning. For details on Universal Library, please refer to the software section of this catalog.

The PCI-DAS-4020/12 boards are fully supported by a wide variety of applications software packages including SoftWIRE[™], DAS-Wizard[™], (and DAS-Wizard Pro[™]), HP VEE[®], HP VEE Lab and LabVIEW[™]. For further details on these, as well as a variety of other software packages, please refer to the software section provided earlier in this catalog.

PCI-DAS4020/12 Specifications

Analog input section

Resolution 12 bits Programmable ranges ±5V, ±1V

4 single-ended, 1 A/D per channel Number of channels

Coupling DC A/D conversion time 40 nS Input Bandwidth 10 MHz

Maximum Sample Rates

Single Channel 20 MHz continuous Two Channels 20 MHz continuous* Four Channels 10 MHz continuous* 20 MHz for 64k samples*

*each channel sampled at rate shown

Via dual 32Kx24 sample FIFO, Data transfer

> with Bus-Master DMA, scattergather, interrupt, or software polled

Minimum sample rate 2 kHz

Differential Linearity error $\pm .4$ LSB typ, ± 1.0 LSB max Integral Linearity error ±1.0 LSB typ, ±2.5 LSB max

Gain drift ±0.4 ppm/°C Reference: ±3 ppm/°C max Zero drift (A/D specs) ±2ppm/°C

2 uA typ, 10 uA max Input leakage current

Input Impedance 2.5 kohms or 50 ohms, solder gap

selectable

Absolute max input voltage +15V

A/D Pacer

A/D Pacer Programmable: Internal counter,

External source or software polled

External Pacer Clock Rate 20 MHz max, 1 kHz min (sample rate

is 1/2 input freq)

A/D Trigger input

A/D Trigger Sources Internal software, External Digital

or External Analog

Internal Software:

Software commands the start of a scan of conversions

Software configurable for rising or falling edge trigger, or high or low level gate. Input is LS TTL compatible

External analog:

Software selectable trigger source can be the EXTATRIG BNC

connector or any of the A/D inputs.

Input Range

Trigger level setting 2.44 mV resolution chan 0 - 3

0 or 2.5 VDC level on Ext Trig BNC

Bandwidth 10 MHz Coupling DC

Trigger/Gate Levels Software configurable for above/

below reference levels or in/out

of window

Pre- / Post-trigger:

Circular buffer allows umlimited pre-trigger conversions. 16M

Analog Output

12 bits Resolution Number of channels 2

Output Range ±10V, ±5 software selectable

Software paced D/A pacing Programmed I/O Data transfer

Offset error ±9mV max ±2LSB max Gain error Monotonicity Guaranteed ±15 ppm/°C max D/A Gain drift D/A Bipolar offset drift ±5 ppm/°C max Throughput System Dependent

Settling time $5\mu s \max (20V \text{ step to } \pm \frac{1}{2}LSB)$

Slew Rate 7V/us Current Drive ±5 mA

Output short-circuit duration 25 mA indefinite

Output coupling DC

Output impedance 0.5 Ohms max

Miscellaneous Single buffered output latch

Update DAC's individually On power-up and reset, both DAC's cleared to 0 volts

Digital Input / Output

40-pin connector header Connector type

I/O ports

2 banks of 8, 2 banks of 4, Configuration

Logic Device 82C55

Output High 3.0 volts min @ -2.5mA Output Low 0.5 volts max @ 2.5 mA

Input High 2.0 volts min, 7 volts abs. max Input Low 0.8 volts max, -0.5 volts abs. min Power-up / reset state Input mode (high impedance)

Interrupts INTA# - mapped to IRQn via PCI

BIOS at boot-time

Interrupt enable Software programmable or

External enable provided at AUX

connector.

Interrupt sources External, internal FIFO status

Crystal oscillator

Frequency 40MHz Frequency accuracy ±50 ppm Duty cycle 50%

Power consumption

+5V 3.1 A typical, 3.6 A max

Environmental

Operating temperature range 0 to 70 °C Storage temperature range

-40 to 100 °C

Humidity

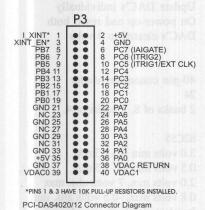
0 to 90% non-condensing

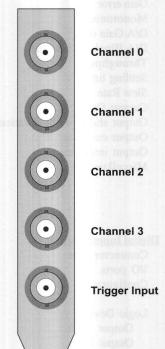
post-trigger conversion capability.

I/O Connector & Cables

All analog input signals and the analog trigger/gate signal are connected through standard BNC connectors. The digital I/O connections as well as the digital control signals are available on the auxilliary 40-pin

header. The 40-pin header is compatible with the CFF40-x series cable. Users wishing to interface the board to DIO24 compatible digital signal conditioning products should use either the C4037F-2 cable or the BP40-37 adaptor. Note that since the 40-37 series interconnects to not connect to pins 38-40, the analog output pins are not available on the 37 pin connector.





View from rear of the PC.

Auto-Calibration / Self-Calibration

In keeping with general plug-and-play standards, the PCI-DAS4020/12 boards have no switches, jumpers or potentiometers. Auto-calibration is performed with digital potentiometers and/or trim D/A converters. Unlike some boards that use software lookup tables for post-acquisition error correction, the PCI-DAS4020/12 boards' data is accurate when written into your computer's memory.

The calibration factors that control the digital trim components are stored in EEROM on the board. You can remove the board from one computer, install it in another, and it will still provide calibrated data.

In addition to being auto-calibrating, the PCI-DAS4020/12 boards are also self calibrating. Standard calibration techniques require a channel to be calibrated with zero volts input (offset calibration) and with a known input voltage (gain calibration). The PCI-DAS4020/12 provides on-board circuitry that will short the inputs allowing offset calibration, and then connect the inputs to an ultra-stable, on-board voltage reference for the gain calibration. A complete PCI-DAS4020/12 calibration is as simple as issuing a single software command.

For a complete discussion of ComputerBoards unique and powerful auto-calibration and self-calibration techniques, please refer to our Auto- and Self-Calibration tutorial on page 270.

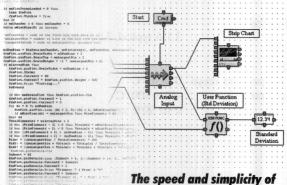
Ordering Guide

PCI-DAS4020/12

4-channel, 20MHz, 12-bit A/D, D/A & digital I/O board for PCI-bus computers.

Graphical Programming for Visual Basic

The power and flexibility of syntactical programming



graphical programming

Introducing SoftWIRE™

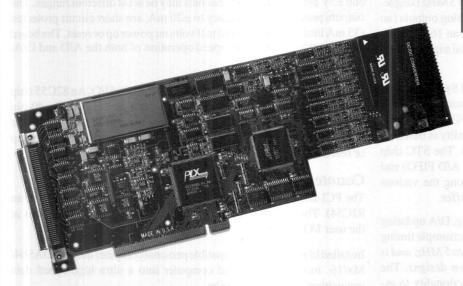
Graphical Programming in Visual Basic®

Syntactical programming has been around since the early days of computers. More recently, graphical programming languages have been introduced and are now a popular alternative to writing hard core, text-based syntax. What's been lacking is an easy way to combine the speed and ease of use of graphical programming with the flexibility and efficiency of writing code in an industry standard language. Until now—Introducing SoftWIRE.

> For more information on SoftWIRE. please see pages 6-10 in this catalog.

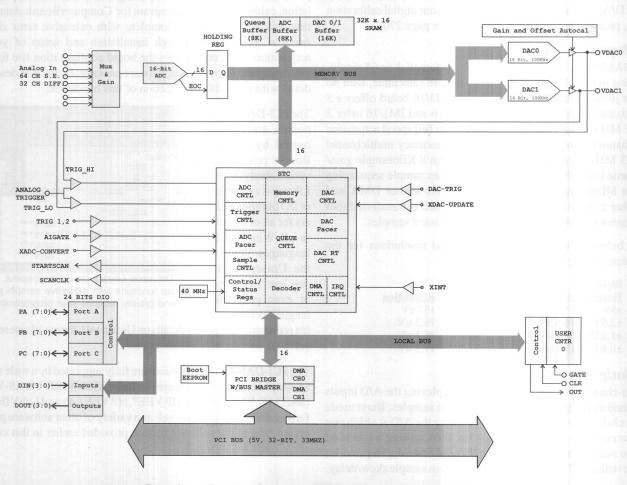
PCI-DAS64/Mx/16 & PCI-DAS64/Mx/16/JR family

Ultra High-Speed PCI-bus Compatible, 16-bit, 64-Channel Analog Input Board with Dual Analog Output Channels & 32 Digital I/O bits



Features

- Ultra High Speed 16-Bit Sample Rates
 PCI-DAS64/M3/16 3 MHz
 PCI-DAS64/M2/16 2 MHz
 PCI-DAS64/M1/16 1 MHz
- 64 channel single-ended / 32 chan diff
- 16-bit A/D resolution
- 8192 sample gain/channel queue
- Bus-master & scatter-gather support
- Analog trigger input (not avail on /JR)
- Burst-Mode SS&H emulation
- 8192 sample A/D FIFO
- Dual 16-bit D/As (not avail on /JR)
- 100 kHz D/A update rate (16-k FIFO)
- One 16-bit counter/ 32-bits, digital I/O
- Fully Plug-and-Play & Autocalibrating



functions using the various sections of the SRAM buffer.

The STC allows simultaneous full speed A/D sampling, D/A updating and gain/channel queue sequencing (with variable intersample timing if desired). The STC chip performs these functions up to 5 MHz, and is available as an OEM component for use in your own designs. The board provides bus-mastering and scatter-gather functionality to assure the desired system timing is maintained.

The PCI-DAS64/Mx/16 family is completely plug-and-play. There are no switches, jumpers or potentiometers on the board. All board addresses, interrupt channels etc. are set by your computers plug-and-play software. Even calibration is performed via software by using on-board trim D/A converters. (For more details on our digital calibration techniques, please see our calibration tutorial on page 270).

Analog Inputs

The PCI-DAS64/Mx/16 provides 32 fully differential or 64 single-ended analog inputs. The input mode is software selectable, with no switches or jumpers to set. The PCI-DAS64/M3/16 board offers a 3 MHz maximum sample rate, while the /M2/16 and /M1/16 offer 2 MHz and 1 MHz sample rates. The boards offer full speed acquisiton in single channel scans, and will perform full accuracy multichannel scans at 1.5 MHz regardless of gain setting. An 8 Kilosample gain/channel queue is available making long, complex sample sequencing simple. An 8Ksample FIFO combine with Bus-Master DMA and scatter-gather to assure data taken from the board is transferred into computer memory without the possibility of missed samples.

The table below details the input ranges and resolutions for the available input configurations and gains.

Bipolar		Unipolar		
Range	Resolution	Range	Resolution	
±5V	153 uV	0 - 10V	153 uV	
±2.5V	76.3 uV	0 - 5V	76.3 uV	
±1.25V	38.1 uV	0-2.5V	38.1 uV	
±0.625V	19.1 uV	0-1.25V	19.1 uV	

Burst Mode

Channel-to-channel skew is the result of multiplexing the A/D inputs and is defined as the time between consecutive samples. Burst mode minimizes channel-to-channel skew by clocking the A/D at a high rate between successive samples within a scan, then waiting a specified time before starting an new scan. The PCI-DAS64/Mx/16 provides burst mode with a 667 nS (1 uS on M1) minimum sample skew/delay.

The PCI-DAS64/Mx/16 provides one 16-bit down counter (1/3 of an 82C54). The counter provides clock, gate and output connections at the user I/O connector.

Installed in any PCI-bus compatible personal computer the PCI-DAS64/Mx/16 turns your personal computer into a ultra high speed data acquisition and control station.

Software

All PCI-DAS64/Mx/16 boards come complete with ComputerBoards' powerful *Insta*CalTM software package. *Insta*Cal is a complete installation, calibration and test program for ComputerBoards data acquisition and control boards. Complete with extensive error checking, *Insta*Cal guides you through installation and setup of your data acquisition board and creates the board configuration file for use by your program or application software package. *Insta*Cal is described in detail within the software section of this handbook.

The PCI-DAS64/Mx/16 boards are fully supported by Computer-Boards' powerful UniversalLibrary. Universal Library is a complete set of I/O libraries and drivers for all of our boards, in all Windows based languages. When using the Universal Library you can switch boards or even programming languages and the syn-



Universal Library provides powerful, easy to use functions with extensive sample programs and greatly reduces your programming effort.

tax remains constant. For details on Universal Library, please refer to the software section of this handbook.

The PCI-DAS-64/Mx/16 boards are fully supported by a wide variety of applications software packages including SoftWIRE[™], DAS-Wizard[™], (and DAS-Wizard Pro[™]), HP VEE[®], HP VEE Lab and LabVIEW[™]. For further details on these, as well as a variety of other software packages, please refer to the software section provided earlier in this catalog.

PCI-DAS64/M#/16 Specifications

Analog input section

Resolution 16-bits

Number of channels 32 diff/64 SE, Software selectable

A/D Specification	PCI-DAS 64/M3/16	PCI-DAS 64/M2/16	PCI-DAS 64/M1/16
A/D conversion time	333 nS	500 nS	1 uS
Single channel, single input range	3 MHz	2 MHz	1 MHz
Single channel, multiple input gains	500 kHz	500 kHz	500 kHz
Multiple channel, single input range	1.5 MHz	1.5 MHz	1 MHz
Multiple channel, multiple input gains, all samples in the same Unipolar/Bipolar mode	500 kHz	500 kHz	500 kHz
Multiple channel, switching gains, switching Bipolar/Unipolar mode	500 kHz	500 kHz	500 kHz
Multiple channel, switching Unipolar/ Bipolar mode, single input gain	750 kHz	750 kHz	750 kHz

Data transfer modes

via 8192 sample FIFO and Bus master DMA,

interrupt, or software polled

Programmable ranges

±5V, ±2.5V, ±1.25V, ±0.625, 0 - 10V, 0 - 5V, 0 - 2.5V, 0 - 1.25V

A/D pacing

Programmable: internal counter or external

source or software polled

Channel/gain queue Burstmode timing

8192 samples. Software selectable option, skew = 667 nS

(1 uS on the /M1 board)

A/D Trigger sources A/D Triggering Modes External: analog or digital

Digital: SW configurable for Edge (triggered) or level-activated (gated). Programmable polarity (rising/falling edge, high/low gate).

Analog: SW configurable for above/below reference, in/out window and hysteresis. Programmable polarity (rising/falling edge trigger, high/low gate). Trigger levels set by DAC0 and/or DAC1. (Analog triggering is not available on the /JR version)

Pre-trigger: Unlimited pre- and post-trigger sample sizes. Compatible with Digital and Analog trigger modes

Diff. Linearity error Integral Linearity error ±1 LSB max

Counter section

Configuration

User connections

±1.5 LSB

Gain Error

22.5 ppm typ, 45 max

No missing codes Gain drift / Zero drift 16- bits guaranteed

±45ppm/°C / ±45ppm/°C Input leakage current Input impedance

2.3 nA (25 °C) 1011 Ohms, typ

±35V

Maximum input voltage

Single 16-Bit down counters 1/3 82C54

Clock in, Gate and Output

Clock input frequency

10Mhz max

Min clock pulse width Gate width high or low

50 nS min

Input low / high voltage Output low / high voltage 30 nS high, 50 nS low

0.8V max / 2.0V min 0.4V max / 3.0V min

Analog Output:

Resolution

Number of channels 2 (not available on /JR version)

Voltage Ranges ±10V, ±5V, 0-5V, 0-10V. Each channel

16-bits

independently programmable

100 kHz on each D/A operating in single channel or simultaneous update mode via 16384 sample FIFO and Bus Master DMA

Supports repetitive waveforms to 16Ksample

Internal or external clock or software paced

or through programmed I/O.

Arbitrary waveform mode

D/A pacing

Data transfer modes

D/A update rate

D/A trigger modes

Software or external gate.

±100uV max, all ranges Offset error Gain error ±30.5ppm max ±1LSB max Differential nonlinearity

Integral nonlinearity ±1LSB max Monotonicity 16-bits at 25 °C ±15 ppm/°C max D/A Gain drift D/A Bipolar offset drift ±5 ppm/°C max D/A Unipolar offset drift ±3 ppm/°C max

Throughput 100kHz, 2 channels simultaneous.

Settling time (20V step to .0008%) 13 µs max Settling time (10V step to .0008%)

10V Ranges 10.7 V/uS Slew Rate 5V Ranges 10.7 V/uS

Current Drive Short-circuit current Output Coupling / impedance

±5 mA min ±35 mA indefinite DC / 0.1 Ohms max

Miscellaneous

Power up/reset, all DAC's set to 0 volts

Digital Input / Output

Digital Bits

Configuration 24-bit, 82C55 at Aux 40-pin connector 4 dedicated input & 4 dedicated output bits

on 100-pin main connector

82C55 Specifications

Configuration

2 banks of 8, 2 banks of 4, programmable by

bank as input or output Default/Reset State Input, High Impedance Output High 2.4 volts @ -2.5 mA min **Output Low** 0.5 volts @ 2.5 mA min

Input High 2.0 volts min, 7 volts absolute max Input Low 0.8 volts max, -0.5 volts absolute min

Dedicated I/O bits (4 input, 4 output) Input / Output device: 74LS175

Default/Reset State All 4 outputs to logic low Output High 2.4 volts @ -0.4 mA min **Output Low** 0.5 volts @ 8.0 mA min

Input High 2.0 volts min, 7 volts absolute max Input Low 0.8 volts max, -0.5 volts absolute min

INTA# - mapped to IRQn via PCI BIOS at Interrupts

boot-time

Interrupt enable Software programmable

Interrupt sources External (rising TTL edge event) or a variety of internal FIFO status sources

Power consumption

+5V Operating

3.0 A typical, 3.7 A max

Environmental

Operating temperature range

0 to 70°C -40 to 100°C

Storage temperature range Humidity

0 to 90% non-condensing

Signal Conditioning & Accessories

Digital Signal Conditioning (requires C40-37F-x or BP40-37)



CIO-ERB08* 8 channel relay rack with 6 Amp, Form C relays CIO-ERB24* 24 channel relay rack with 6 Amp, Form C relays CIO-SERB24* 24 channel relay rack with 10 Amp, socketed and field replacable Form Crelays.

SSR-RACK08* 8 channel solid state I/O module rack. SSR-RACK24* 24 channel solid state I/O module rack.

BNC Connector Interface Boxes



BNC-16SE/M BNC interface box for single-ended mode. Four are

required to connect all 64 channels.

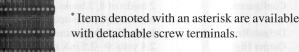
BNC-16DI/M BNC interface box for differential mode. Four are

required to connect to all 32 channels.

Screw Terminal Accessory Boards and Boxes **SCB-Series & CIO-MINI series**



The main 100-pin connector is compatible with the C100HD-03 ribbon and C100HDS-03 shielded cable and the SCB-50 (1 required) or CIO-MINI50 (2 required). The C100HDS-03 series shielded cable provides maximum noise immunity and is compatible with the SCB-100 screw terminal interface box. The auxilliary digital connector is compatible with the CIO-MINI40 using the C40FF-2 cable.



Auto-Calibration / Self-Calibration

In keeping with general plug-and-play standards, the PCI-DAS64/Mx/ 16 boards have no switches, jumpers or potentiometers. Auto-calibration is performed with digital potentiometers and/or trim D/A converters. Unlike some boards that use software lookup tables for postacquisition error correction, the PCI-DAS64/Mx/16 board's data is accurate when written into your computer's memory. The calibration factors that control the digital trim components are stored in EEPROM on the board. You can remove the board from one computer, install it in another, and it will still provide calibrated data.

The PCI-DAS64/Mx/16 board is also self calibrating. The PCI-DAS64/ Mx/16 provides on-board circuitry that grounds the inputs for offset calibration, and connects the inputs to an ultra-stable, on-board voltage reference for gain calibration. A complete PCI-DAS64/Mx/16 calibration is as simple as issuing a single software command.

For a complete discussion of ComputerBoards unique and powerful auto-calibration and self-calibration techniques, please refer to our Auto- and Self-Calibration tutorial on page 270.

I/O Connector & Cables

All analog, triggering and counter/timer connections are through a 100pin high-density connector. The C100HD50-3 standard cable cable splits the 100 pins into seperate 50-pin cables. The first 50-pin cable contains the signals from pins 1-50, while the second carries pins 51-100. These 50-pin connectors are compatible with the SCB-50, CIO-MINI50, and BNC-series of interconnects. To minmize noise pickup, use the C100HDS-03 series shielded cable along with the SCB-100 shileded interconnection box. The 24-bits of digital I/O are available on an 40 pin header. From the 40-pin header the user connect to the optional BP40-37 which brings these pins out to the standard 37-pin connector and installs in any unused slot. This 37-pin connector is then pin compatible with all DIO24 series boards (and all of our 8 and 24-bit digital signal

conditioning boards). Alternatively, the 40-pin header may be brought out directly with the C40FF-2 cable and connected directly to a CIO-MINI40 screw terminal board.

NC NC PB7 +5V GND PC7 PC6 2 +5V 4 GND 6 PC7 8 PC6 10 PC5 11 PC4 14 PC3 16 PC2 12 PC4 18 PC1 12 PC4 18 PC1 26 PA6 26 PA6 28 PA4 30 PA3 31 PA3 NC 3 PB7 5 PB6 7 PB5 9 PB4 11 PB3 13 PB2 15 PB1 17 PB1 17 PB0 19 GND 21 NC 23 GND 25 NC 27 GND 29 NC 31 GND 33 +5V 35 GND 37

Auxiliary/Digital Connector Diagram

IN0HI IN32/IN0LO IN1HI IN33/IN1LO IN2HI IN34/IN2LO IN3HI IN35/IN3LO IN4HI 11121314156171819221232245226272289331323334536738894414243445467449 IN36/IN4LO IN5HI IN37/IN5LO IN38/IN6LO IN7HI IN39/IN7LO LLGND IN8HI IN40/IN8LO IN9HI IN41/IN9LO IN10HI IN42/IN10LO IN11HI IN11HI IN43/IN11LO IN12HI IN44/IN12LO IN13HI IN45/IN13LO IN14HI IN14HI IN46/IN14LO IN15HI IN47/IN15LO DAORTN DAOR IN
VDAC0
DA1RTN
VDAC1
am CTRCLK
CTRGATE
CTROUT BUF
EXTADCCONVERT

IN16HI IN48/IN16LO IN17HI IN17HI IN49/IN17LO IN18HI IN50/IN18LO IN39HI IN51/IN19LO IN20HI IN52/IN20LO IN21HI IN53/IN21LO IN22HI IN53/IN22LO IN23HI IN55/IN23LO LLGND IN24HI IN56/IN24LO IN25HI IN56/IN25LO IN26LO IN27HI IN59/IN27LO IN28HI IN59/IN28LO IN28HI IN59/IN28HI IN60/IN28LO IN60/IN28LO IN29HI IN61/IN29LO IN30HI IN62/IN30LO IN31HI IN31HI IN63/IN31LO DOUT0 DOUT1 DOUT2 DOUT3 DOUT3 GND +12V GND -12V DIN2 DIN3 SCANCLK BUF EXTDACUPDATE DACTRIG AIGATE XINT GND

Ordering Guide

STARTSCAN BUF

DIN1

PCI-DAS64/M3/16

PCI-DAS64/M3/16/JR

PCI-DAS64/M2/16

PCI-DAS64/M2/16/JR

PCI-DAS64/M1/16

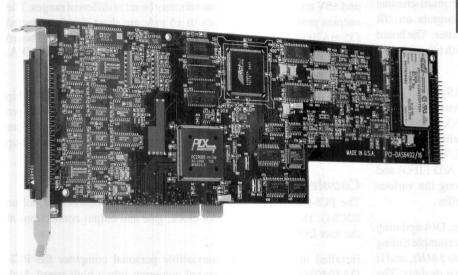
PCI-DAS64/M1/16/JR

64-channel, 3MHz, 16-bit analog & digital I/O board for PCI-bus computers. 64-channel, 3MHz, 16-bit A/D & digital I/O board for PCI-bus computers. 64-channel, 2MHz, 16-bit analog & digital I/O board for PCI-bus computers. 64-channel, 2MHz, 16-bit A/D & digital I/O board for PCI-bus computers. 64-channel, 1MHz, 16-bit analog & digital I/O board for PCI-bus computers. 64-channel, 1MHz, 16-bit A/D & digital I/O board for PCI-bus computers.

PCI-DAS6402/16 & PCI-DAS6402/16/JR

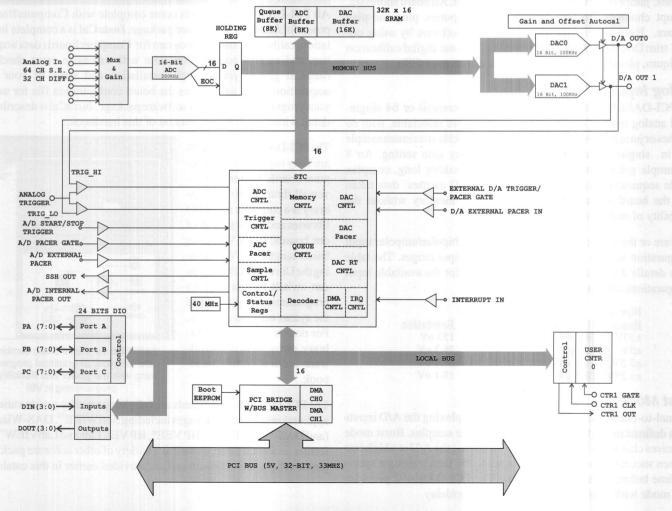
High-Speed PCI-bus Compatible, 16-bit, 64-Channel Analog Input Board with

Dual Analog Output Channels & 32 Digital I/O bits



Features

- 64 channel single-ended / 32 chan diff
- 16-bit A/D resolution
- 200 kHz sample rate
- 8192 sample gain/channel queue
- Bus-master & scatter-gather support
- Analog trigger input (not avail on /JR)
- Burst-Mode SS&H emulation
- 8192 sample A/D FIFO
- Dual 16-bit D/As (not avail on /JR)
- 100 kHz D/A update rate (16-k FIFO)
- Provides arbitrary waveform generation
- One 16-bit counter/ 32-bits, digital I/O
- Fully Plug-and-Play & Autocalibrating



Functional Description

The PCI-DAS6402/16 analog and digital I/O board sets a new standard for high channel count, high resolution data acquisition on the PCI-bus. Offering 64 single-ended or 32 differential 16-bit analog inputs with sample rates up to 200 kHz (single-channel or multi-channel sampling), two 16-bit analog outputs (no analog outputs on /JR version), 32 bits of digital I/O and one 16-bit down counter. The board offers a variety of analog and digital trigger modes with trigger levels and direction selectable by software.

At the heart of the board is ComputerBoards' powerful System Timing Controller (STC) chip. The STC chip controls all A/D sampling and D/A update rates as well as controlling the 8K A/D FIFO, the 8K gain/channel queue and the 16K D/A FIFO. This functionality is based on the STC chip's use of an on-board 32K x 16 SRAM. The STC chip assigns functions to various parts of the SRAM (e.g. A/D FIFO) and then provides full speed control and arbitration among the various functions using the various sections of the SRAM buffer.

The STC allows simultaneous full speed A/D sampling, D/A updating and gain/channel queue sequencing (with variable intersample timing if desired). The STC chip performs these functions up to 5 MHz, and is available as an OEM component for use in your own designs. The board provides bus-mastering and scatter-gather functionality to assure the desired system timing is maintained.

The PCI-DAS6402/16 is completely plug-and-play. There are no switches, jumpers or potentiometers on the board. All board addresses, interrupt channels etc. are set by your computers plug-and-play software. Even calibration is performed via software by using onboard trim D/A converters. (For more details on our digital calibration techniques, please see our calibration tutorial on page 270).

Analog Inputs

The PCI-DAS6402/16 provides 32 fully differential or 64 single-ended analog inputs. The input mode is software selectable, with no switches or jumpers to set. The board offers a 200 kHz maximum sample rate in single and multichannel scans at any gain setting. An 8 Kilosample gain/channel queue is available making long, complex sample sequencing simple. An 8Ksample FIFO assures data taken from the board is transferred into computer memory without the possibility of missed samples.

Software or the gain/channel queue selects the bipolar/unipolar input configuration as well as selecting among the input ranges. The table below details the input ranges and resolutions for the available input configurations and gains.

Bipolar		Unipolar		
Range	Resolution	Range	Resolution	
±10V	305 uV	0 - 10V	153 uV	
±5V	153 uV	0 - 5V	76.3 uV	
±2.5V	76.3 uV	0-2.5V	38.1 uV	
±1.25V	38.1 uV	0-1.25V	19.1 uV	

Burst Mode

Channel-to-channel skew is the result of multiplexing the A/D inputs and is defined as the time between consecutive samples. Burst mode minimizes channel-to-channel skew by clocking the A/D at a high rate between successive samples within a scan, and then waiting a specified time before starting an new scan. The PCI-DAS6402 provides burst mode with a 5uS minimum sample skew/delay.

Analog Outputs (there are no analog outputs on the/JR version) The PCI-DAS6402/16 provides two high speed 16-bit analog outputs. The analog outputs are updated via on-board 16 K FIFO and provide a 100 kHz max. update rate. Repetitve D/A-based waveforms can be stored in on-board memory and generated without requiring ongoing PCI bus transfers. Software selectable ranges of 0-10V, 0-5V, \pm 10V and \pm 5V are provided, and channels may be set at different ranges. The outputs provide rated accuracy to \pm 5 mA, are short circuit protected (35 mA limit) and are cleared to 0 volts on power up or reset. The board supports simultaneous full speed operation of both the A/D and D/A.

Parallel Digital I/O

The PCI-DAS6402/16 provide 32 bits of digital I/O. An 82C55 chip provides 24 bits of CMOS compatible I/O at the board's 40-pin auxilliary connector. Four LSTTL compatible digital inputs and four outputs are also provided on the main 100-pin connector. On power up or reset, all I/O ports default to the input state (high impedance).

Counter/Timer I/O

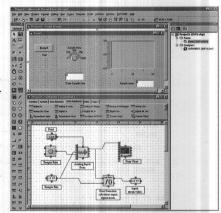
The PCI-DAS6402/16 provides one 16-bit down counter (1/3 of an 82C54). The counter provides clock, gate and output connections at the user I/O connector.

Installed in any PCI-bus compatible personal computer the PCI-DAS6402/16 turns your personal computer into a high speed, high resolution data acquisition and control station.

Software

All PCI-DAS6402/16 boards come complete with ComputerBoards' powerful *Insta*Cal[™] software package. *Insta*Cal is a complete installation, calibration and test program for ComputerBoards data acquisition and control boards. Complete with extensive error checking, *Insta*Cal guides you through installation and setup of your data acquisition board and creates the board configuration file for use by your program or application software package. *Insta*Cal is described in detail within the software section of this handbook.

The PCI-DAS6402/16 boards are fully supported by ComputerBoards' powerful UniversalLibrary. Universal Library is a complete set of I/O libraries and drivers for all of our boards, in all Windows based languages. When using the Universal Library you can switch boards or even programming languages and the syntax remains constant. For details on Universal Library, please refer to the software section of this handbook.



SoftWIRE for Visual Basic combines the simplicity of graphical programming with the power and flexibility of programming in VB!

The PCI-DAS-6402/16 boards are fully supported by a wide variety of applications software packages including SoftWIRE[™], DAS-Wizard[™], (and DAS-Wizard Pro[™]), HP VEE[®], HP VEE Lab and LabVIEW[™]. For further details on these, as well as a variety of other software packages, please refer to the software section provided earlier in this catalog.

PCI-DAS6402/16 Specifications

Analog input section

Resolution 16-bits

32 diff/64 SE, Software selectable Number of channels

A/D conversion time 5µs

Sample rate 200 kHz (single or multiple channel)

Sample rates with gain/channel queue

Single channel, single input range 200 kHz Multiple channels, same input range 200 kHz

Single or multiple channels, changing input ranges, all channels in the same

unipolar or bipolar mode 200 kHz

Single or multiple channel, changing input ranges, channels in both unipolar

and bipolar modes 200 kHz

via 8192 sample FIFO and Bus master DMA, Data transfer modes

interrupt, or software polled

Programmable ranges ±10V, ±5V, ±2.5V, ±1.25V, 0 - 10V,

0 - 5V, 0 - 2.5V, 0 - 1.25V

A/D pacing Programmable: internal counter or external

source or software polled

Channel/gain queue 8192 samples.

Burstmode Software selectable option, skew = 5μ s

A/D Trigger sources External: analog or digital

A/D Triggering Modes

Digital: SW configurable for Edge (triggered) or level-activated (gated). Programmable polarity (rising/falling edge, high/low gate).

Analog: SW configurable for above/below reference, in/out window and hysteresis. Programmable polarity (rising/falling edge trigger, high/low gate). Trigger levels set by DAC0 and/or DAC1. (Analog triggering is not available on the /JR version)

Pre-trigger: Unlimited pre- and post-trigger sample sizes. Compatible with Digital and Analog trigger modes

Diff. Linearity error ±1.25V range ±3 LSB all other ranges ±1 LSB

Integral Linearity error ±1.25V ±3 LSB all other ranges ±1.5 LSB

Gain Error ±1.25V, 0-1.25V 22.5 ppm typ, 45 max

all other ranges 22.5ppm max

No missing codes 16- bits guaranteed ±7ppm/°C / ±2ppm/°C Gain drift / Zero drift Input leakage current 200nA (25 Deg C) Input impedance 10 Meg Ohms, Min

Maximum input voltage ±40V

Counter section

Configuration Single 16-Bit down counters 1/3 82C54 User connections Clock in, Gate and Output all available at

I/O connector

Clock input frequency 10Mhz max High pulse width (clk input) 30ns min Low pulse width (clk input) 50ns min Gate width high or low 50ns min Input low voltage 0.8V max Input high voltage 2.0V min Output low voltage 0.4V max Output high voltage 3.0V min

Analog Output: Resolution

D/A update rate

16-bits 2 (not available on /JR version) Number of channels

±10V, ±5V, 0-5V, 0-10V. Each channel Voltage Ranges

> independently programmable 100 kHz on each D/A operating in

single channel or simultaneous update mode Data transfer modes

via 16384 sample FIFO and Bus Master DMA

or through programmed I/O.

Arbitrary waveform mode Supports repetitive waveforms to 16Ksample D/A pacing

Internal or external clock or software paced

D/A trigger modes Software or external gate.

Offset error ±100uV max, all ranges

Gain error ±30.5ppm max Differential nonlinearity ±1LSB max ±1LSB max Integral nonlinearity Monotonicity 16-bits at 25 °C D/A Gain drift ±15 ppm/°C max D/A Bipolar offset drift ±5 ppm/°C max D/A Unipolar offset drift ±3 ppm/°C max

Throughput 100kHz, 2 channels simultaneous.

Settling time (20V step to .0008%) 13 µs max Settling time (10V step to .0008%) 6µs typ

Slew Rate 10V Ranges 6 V/uS

5V Ranges 3 V/uS

Current Drive ±5 mA min Short-circuit current ± 35 mA indefinite DC / 0.1 Ohms max Output Coupling / impedance

Miscellaneous Power up/reset, all DAC's set to 0 volts

Digital Input / Output

Digital Bits

Configuration 24-bit, 82C55 at Aux 40-pin connector

4 dedicated input & 4 dedicated output bits

on 100-pin main connector

82C55 Specifications

Default/Reset State

Output High

Output Low

Configuration 2 banks of 8, 2 banks of 4, programmable by

> bank as input or output Input, High Impedance 2.4 volts @ -2.5 mA min 0.5 volts @ 2.5 mA min

Input High 2.0 volts min, 7 volts absolute max Input Low 0.8 volts max, -0.5 volts absolute min

Dedicated I/O bits (4 input, 4 output)

Input / Output device: 74LS175 Default/Reset State

All 4 outputs to logic low Output High 2.4 volts @ -0.4 mA min 0.5 volts @ 8.0 mA min **Output Low**

Input High 2.0 volts min, 7 volts absolute max Input Low 0.8 volts max, -0.5 volts absolute min

Interrupts INTA# - mapped to IRQn via PCI BIOS at

boot-time

Interrupt enable Software programmable

Interrupt sources External (rising TTL edge event) or a variety

of internal FIFO status sources

Power consumption

+5V Operating 2.7A typical, 3.1A max

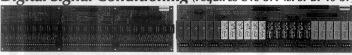
Environmental

0 to 70°C Operating temperature range -40 to 100°C Storage temperature range

0 to 90% non-condensing Humidity

Signal Conditioning & Accessories

Digital Signal Conditioning (requires C40-37F-xx or BP40-37)



CIO-ERB08* 8 channel relay rack with 6 Amp, Form C relays CIO-ERB24* 24 channel relay rack with 6 Amp, Form C relays CIO-SERB24* 24 channel relay rack with 10 Amp, socketed and field replacable Form C relays.

8 channel solid state I/O module rack. SSR-RACK08* SSR-RACK24* 24 channel solid state I/O module rack.

BNC Connector Interface Boxes



BNC-16SE BNC interface box for single-ended mode. Four are

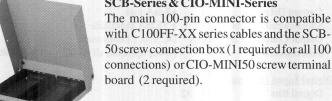
required to connect all 64 channels.

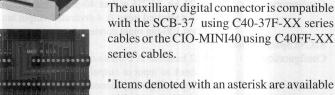
BNC-16DI BNC interface box for differential mode. Four are

required to connect to all 32 channels.

Screw Terminal Accessory Boards and Boxes

SCB-Series & CIO-MINI-Series





cables or the CIO-MINI40 using C40FF-XX

* Items denoted with an asterisk are available with detachable screw terminals.

Auto-Calibration / Self-Calibration

In keeping with general plug-and-play standards, the PCI-DAS6402/16 board has no switches, jumpers or potentiometers. Auto-calibration is performed with digital potentiometers and/or trim D/A converters. Unlike some boards that use software lookup tables for post-acquisition error correction, the PCI-DAS6402/16 board's data is accurate when written into your computer's memory. The calibration factors that control the digital trim components are stored in EEPROM on the board. You can remove the board from one computer, install it in another, and it will still provide calibrated data.

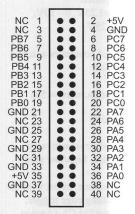
In addition to being auto-calibrating, the PCI-DAS6402/16 board is self calibrating. The PCI-DAS6402/16 provides on-board circuitry that grounds the inputs for offset calibration, and connects the inputs to an ultra-stable, on-board voltage reference for gain calibration. A complete calibration is as simple as issuing a single software command.

For a complete discussion of ComputerBoards unique and powerful auto-calibration and self-calibration techniques, please refer to our Auto- and Self-Calibration tutorial on page 270.

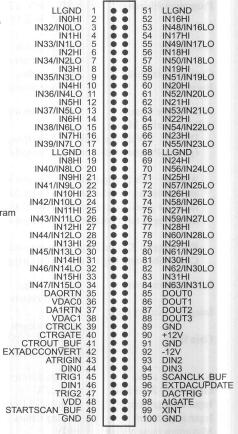
I/O Connector & Cables

All analog, triggering and counter/timer connections are through a 100pin connector. The C100FF-XX series cable splits the 100 pins into seperate 50-pin cables. The first 50-pin cable contains the signals from pins 1-50, while the second carries pins 51-100. These 50-pin connectors are compatible with the SCB-50 screw connection box (one required), the CIO-MINI50 screw terminal board (two required), and the BNC-16 series (one required for each 16 SE or 8 DIFF channels).

The 24-bits of high current digital I/O are available on an 40 pin header. From the 40-pin header the user connect to the optional BP40-37 which brings these pins out to the standard 37-pin connector and installs in any unused slot. This 37-pin connector is then pin compatible with all DIO24 series boards (and all of our 8 and 24-bit digital signal conditioning boards). Alternatively, the 40-pin header may be brought out directly with the C40FF-2 cable and connected directly to a CIO-MINI40 screw terminal board.



Auxiliary/Digital Connector Diagram



PCI-DAS6402/16 Main Connector

Ordering Guide

PCI-DAS6402/16

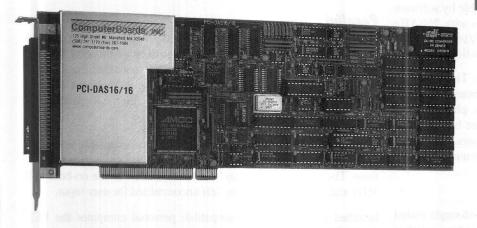
64-channel, 200kHz, 16-bit analog & digital I/O board for PCI-bus computers.

PCI-DAS6402/16/JR

64-channel, 200kHz, 16-bit A/D & digital I/O board for PCI-bus computers.

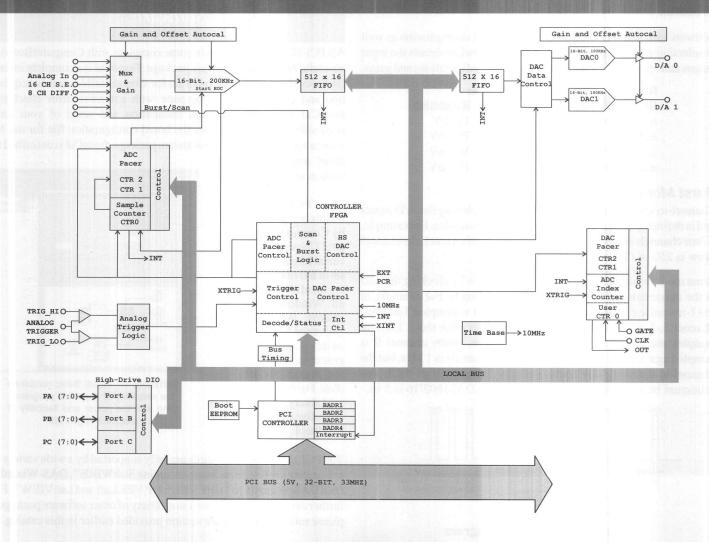
PCI-DAS1602/16 & PCI-DAS1602/16/JR

High-Speed PCI-bus Compatible, 16-bit, 16-Channel Analog Input Board with Dual Analog Output Channels & 24 Digital I/O bits



Features

- 16 channel SE / 8 channel diff.
- 16-bit A/D resolution
- 200 kHz sample rate
- Analog trigger input (not avail on /JR)
- Burst-Mode SS&H emulation
- 512 sample FIFO
- Dual 16-bit D/As (not avail on /JR)
- 100 kHz D/A update rate
- One 16-bit counter
- 24-bits, high current digital I/O
- Fully Plug-and-Play
- Fully Autocalibrating



Functional Description

The PCI-DAS1602/16 multifunction analog and digital I/O board sets a new standard for high speed, high resolution data acquisition on the PCI-bus. Offering 16 single-ended or 8 differential 16-bit analog inputs with sample rates up to 200 kHz, 24 bits of high current digital I/O, three 16-bit down counters. The PCI-DAS1602/16 has an analog trigger input with trigger levels and direction selectable by software and offers two FIFO buffered 16-bit analog outputs with 250 kHz maximum update rates. The lower cost PCI-DAS1602/16/JR does not provide the analog output or analog input trigger functions.

The PCI-DAS1602/16 is completely plug-and-play. There are no switches, jumpers or potentiometers on the board. All board addresses, interrupt channels etc. are set by your computer's plug-and-play software. Even calibration is performed via software by using onboard digital potentiometers and trim D/A converters. (For more details on our digital calibration techniques, please see our calibration tutorial on page 270).

Analog Inputs

The PCI-DAS1602/16 provides 8 fully differential or 16 single-ended analog inputs. The input mode is software selectable, with no switches or jumpers to set. The board offers a 200 kHz maximum sample rate in single and multichannel scans at any gain setting. A 512 sample FIFO assures data taken from the board is transferred into computer memory without the possibility of missed samples.

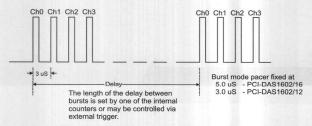
Software also selects the bipolar/unipolar input configuration as well as selecting among the input ranges. The table below details the input ranges and resolutions for the available input configurations and gains.

Bipolar		Unipolar		
Range	Resolution	Range	Resolution	
±10V	305 uV	0 - 10V	153 uV	
±5V	153 uV	0 - 5V	76.3 uV	
±2.5V	76.3 uV	0-2.5V	38.1 uV	
±1.25V	38.1 uV	0-1.25V	19.1 uV	

Burst Mode

Channel-to-channel skew is the result of multiplexing the A/D inputs and is defined as the time between consecutive samples. For example, if four channels are sampled at a rate of 1 kHz per channel, the channel skew is $250 \,\mu s$ (1 ms/4).

Burst mode minimizes channel-to-channel skew by clocking the A/D at the maximum rate between successive channels. For example, at the 1-ms pulse channel 0 is sampled, channel 1 is sampled 5 μ s later, channel 2, 5 μ s after that, and channel 3, 5 μ s after that. Then no samples are taken until the next 1-ms pulse, when channel 0 is sampled again. In this mode the rate for all channels is 1 kHz, but the channel-to-channel skew (delay) is now 5 μ s, or 20 μ s total. The minimum burst mode skew/delay on the PCI-DAS1602/16 is 5 μ s.



Burst Mode Timing Diagram

Analog Outputs

The PCI-DAS1602/12 provides two channels of high speed 16-bit analog output. The analog outputs are updated via on-board FIFO and REP OUTSW commands and provide a 100 kHz max. update rate. Software selectable output ranges of 0-10V, 0-5V, ± 10 V and ± 5 V are provided, and channels may be set at different ranges. The D/A outputs provide rated accuracy to ± 5 mA, are short circuit protected (25 mA limit) and are cleared to 0 volts on power up or reset.

Parallel Digital I/O

The PCI-DAS1602/16 provide 24 bits of high current (64mA sink, 15 mA source) parallel, digital I/O in the form of two 8-bit ports, and two 4-bit ports. This digital capability is an 82C55 mode 0 chip emulation, allowing each port to be set independently as input or output. On power up or reset, the ports default to the input state (high impedance).

Counter/Timer I/O

The PCI-DAS1602/16 provides one 16-bit down counter (one third of an 82C54 chip). The counter provides clock, gate and output connections. The Counter clock may also be connected to the on-board 10 MHz xtal oscillator or may be left uncommitted for user input.

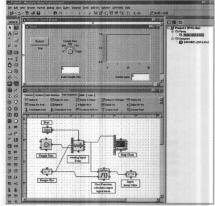
Installed in any PCI-bus compatible personal computer the PCI-DAS1602/16 turns your personal computer into a high speed data acquisition and control station suitable for laboratory data collection, instrumentation, production test, or industrial monitoring.

Software

All PCI-DAS1602/16 boards come complete with ComputerBoards' powerful *Insta*CalTM software package. *Insta*Cal is a complete installation, calibration and test program for ComputerBoards data acquisition and control boards. Complete with extensive error checking, *Insta*Cal guides you through installation and setup of your data acquisition board and creates the board configuration file for use by your program or application software package. *Insta*Cal is described in

detail within the software section of this handbook.

The PCI-DAS1602/16 boards are fully supported by ComputerBoards' powerful UniversalLibrary. Universal Library is a complete set of I/O libraries and drivers for all of our boards, for all Windows based languages. When using the Universal Library you can switch boards or even programming languages and the syntax remains constant. For details on Universal Library, please refer to the software section of this handbook.



SoftWIRE for Visual Basic combines the simplicity of graphical programming with the power and flexibility of programming in VB!

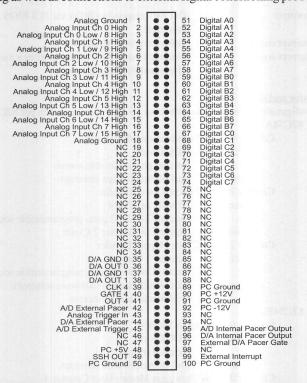
The PCI-DAS-1602/16 boards are fully supported by a wide variety of applications software packages including SoftWIRE™, DAS-Wizard™, (and DAS-Wizard Pro™), HP VEE Bab and LabVIEW™. For further details on these, as well as a variety of other software packages, please refer to the software section provided earlier in this catalog.

Configuration Two 82C54s with three 16-BIT down counters per 82C54 samples must be > 512. Compatible with Digital and Analog trigger 82C54A: Data transfer via 512 sample FIFO via REPINSW, Counter 0 - ADC residual sample counter interrupt, or software polled Source: ADC Clock. Gate: Internal programmable source Unipolar/Bipolar, software selectable Polarity Output: End-of-Acquisition interrupt 8 diff/16 SE. Software selectable Number of channels Counter 1 - ADC Pacer Lower Divider A/D conversion time 5us Source: 10 MHz oscillator 200kHz min Throughput Tied to Counter 2 gate, programmable source Gate: Chained to Counter 2 Clock Output: Diff. Linearity error ±1.25V range ±3 LSB Counter 2 - ADC Pacer Upper Divider ±1 LSB all other ranges Source: Counter 1 Output. ±1.25V ±3 LSB Integral Linearity error Gate: Tied to Counter 1 gate, programmable source all other ranges +1.5 LSB ADC Pacer clock (if software selected), Output: Gain Error ±1.25V, 0-1.25V 22.5 ppm typ, 45 max available at user connector. all other ranges 22.5ppm max 82C54B: No missing codes 16 bits guaranteed Counter 0 - Pretrigger Mode ±20ppm/°C / ±10ppm/°C Gain drift / Zero drift ADC Clock. Source: 200nA (25 Deg C) Input leakage current Gate: External trigger Input impedance 10 Meg Ohms, Min End-of-Acquisition interrupt. Output: Maximum input voltage ±40V Counter 0 - Non-Pretrigger Mode - User Counter 4 User input at 100pin connector (CLK4) or Source: **Analog Output:** internal 10MHz (software selectable) Resolution 16-bits Gate: User input at 100pin connector (GATE4) Number of channels 2 Output: Available at 100pin connector (OUT4) Voltage Ranges ±10V, ±5V, 0-5V, 0-10V. Each channel Counter 1 - DAC Pacer, Lower Divider independently programmable Source: 10 MHz on-board oscillator Gate: Tied to counter 2 Gate D/A pacing Internal or external clock or software paced Output: Chained to Counter 2 Clock D/A trigger modes Software or external gate. Counter 2 - DAC Pacer, Upper Divider Data transfer via 512 sample FIFO via REPOUTSW or Counter 1 Output Source: programmed I/O. Tied to Counter 1 Gate Gate: Offset error ±100uV max, all ranges (calibrated) Output: DAC Pacer Clock (available at I/O connector) ±30.5ppm max (calibrated) Gain error Differential nonlinearity ±1LSB max Clock input frequency 10Mhz max Integral nonlinearity ±1LSB max High pulse width (clk input) 30ns min Monotonicity 16 bits at 25 DegC Low pulse width (clk input) 50ns min D/A Gain drift ±15 ppm/°C max Gate width high or low 50ns min D/A Bipolar offset drift ±5 ppm/°C max Input low voltage 0.8V max D/A Unipolar offset drift ±3 ppm/°C max Input high voltage 2.0V min Output low voltage 0.4V max Throughput 100kHz, 2 channels simultaneous. Output high voltage 3.0V min Settling time (20V step to .0008%) 13 µs max Settling time (10V step to .0008%) 6µs typ Power consumption Slew Rate 10V Ranges 6V/uS +5V Operating 2.0A typical, 2.1A max 3V/uS **5V Ranges** Environmental Current Drive ±5 mA min Operating temperature range 0 to 70°C Short-circuit current 25 mA indefinite Storage temperature range -40 to 100°C DC / 0.1 Ohms max Output Coupling / impedance Humidity 0 to 90% non-condensing Miscellaneous Power up/reset, all DAC's set to 0 volts

Ciliminos pre una post argger sampres. Tour " or

I/O Connector & Cables

All I/O signals are brought through a 100-pin high-density connector. The (optional) C100FF-XX series cable splits the 100 pins into two seperate 50-pin cables. The first 50-pin cable contains the signals from pins 1-50, while the second carries pins 51-100 and keeps the analog signals in one cable and the digital in another. This configuration minimizes noise in the analog signal lines and greatly simplifies field wiring as well as connections to external signal conditioning products.



Auto-Calibration / Self-Calibration

In keeping with general plug-and-play standards, the PCI-DAS1602/16 board has no switches, jumpers or potentiometers. *Auto-calibration* is performed with digital potentiometers and/or trim D/A converters. Unlike some boards that use software lookup tables for post-acquisition error correction, the PCI-DAS1602/16 board's data is accurate when written into your computer's memory.

The calibration factors that control the digital trim components are stored in EEPROM on the board. You can remove the board from one computer, install it in another, and it will still provide calibrated data.

In addition to being auto-calibrating, the PCI-DAS1602/16 board is self-calibrating. Standard calibration techniques require a channel to be calibrated with zero volts input (offset calibration) and with a known input voltage (gain calibration). The PCI-DAS1602/16 provides on-board circuitry that will short the inputs allowing offset calibration, and then connect the inputs to an ultra-stable, on-board voltage reference for the gain calibration. A complete PCI-DAS1602/16 calibration is as simple as issuing a single software command.

For a complete discussion of ComputerBoards unique and powerful auto-calibration and self-calibration techniques, please refer to our Auto- and Self-Calibration tutorial on page 270.

Signal Conditioning & Accessories

Analog Signal Conditioning





ISO-RACK16/P* 16-channel ISO-5B module rack connects an ISO-

5B module to each analog input channel.

ISO-DA02/P* 2-channel ISO-5B module rack connects a ISO-5B

module to each analog output channel.

Digital Signal Conditioning (requires DADP-5037 adaptor)



CIO-ERB24* 24 channel relay rack with 6 Amp, Form C relays CIO-SERB24* 24 channel relay rack with 10 Amp, socketed and

field replacable Form C relays.

SSR-RACK24* 24 channel solid state I/O module rack.

BNC Connector Interface Boxes



BNC-16SE BNC interface box for 16 channel single-ended

mode. Brings each channel out to a BNC connector. BNC interface box for 8 channel differential mode.

Each channel has a separate + and - BNC connector.

Screw Terminal Accessory Boards and Boxes



BNC-16DI

SCB-Series & CIO-MINI-Series

The main 100-pin connector is compatible with C100FF-03 series cables and the SCB-50 screw connection box (1 required for all 100 connections) or CIO-MINI50 screw terminal board (2 required).

* Items denoted with an asterisk are available with detachable screw terminals.



Ordering Guide

PCI-DAS1602/16

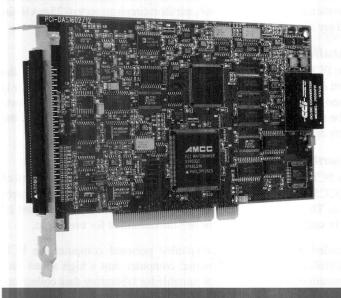
16-channel, 200 kHz, 16-bit A/D, D/A & digital I/O board for PCI-bus computers.

PCI-DAS1602/16/JR

16-channel, 200 kHz, 16-bit A/D & digital I/O board for PCI-bus computers.

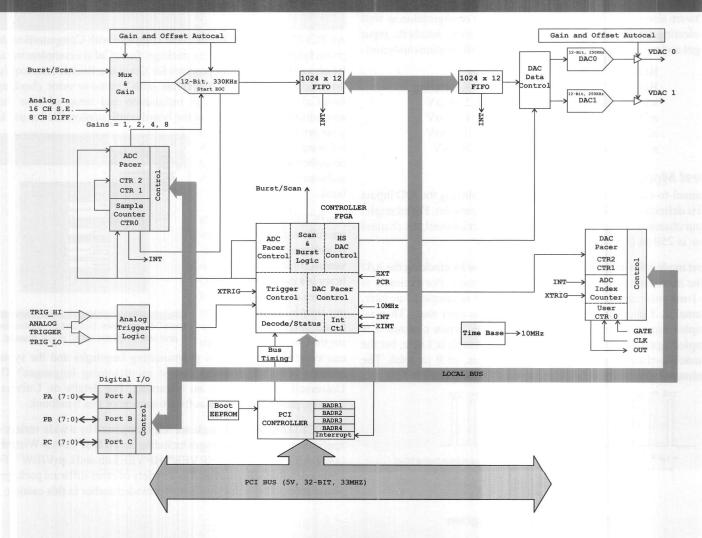
PCI-DAS1602/12

High-Speed PCI-bus Compatible, 16-Channel Analog Input Board with Dual Analog Output Channels & 24 Digital I/O bits



Features

- 16 channel SE / 8 channel diff.
- 12-bit A/D resolution
- 330 kHz sample rate
- · Analog trigger input
- Burst-Mode SS&H emulation
- 1024 sample FIFO
- Dual 12-bit D/As with 250 kHz update rate
- One 16-bit counter
- 24-bits digital I/O
- Fully Plug-and-Play
- Fully Autocalibrating



Functional Description

The PCI-DAS1602/12 multifunction analog and digital I/O board sets a new standard for high performance data acquisition on the PCI-bus. Offering 16 single-ended or 8 differential 12-bit analog inputs with sample rates up to 330 kHz, 24 bits of digital I/O, three 16-bit down counters. The PCI-DAS1602/12 has an analog trigger input with trigger levels and direction selectable by software. In addition, the PCI-DAS1200 offers two FIFO buffered 12-bit analog outputs with 250 kHz maximum update rates .

The PCI-DAS1602/12 is completely plug-and-play. There are no switches, jumpers or potentiometers on the board. All board addresses, interrupt channels etc. are set by your computer's plug-and-play software. Even calibration is performed via software by using onboard digital potentiometers and trim D/A converters. (For more details on our digital calibration techniques, please see our calibration tutorial on page 270).

Analog Inputs

The PCI-DAS1602/12 provides 8 fully differential or 16 single-ended analog inputs. The input mode is software selectable, with no switches or jumpers to set. The board offers a 330 kHz maximum sample rate in single and multichannel scans at any gain setting. A 1024 sample FIFO assures data taken from the board is transferred into computer memory without the possibility of missed samples.

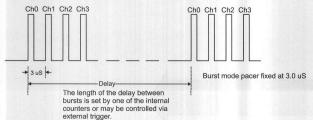
Software also selects the bipolar/unipolar input configuration as well as selecting among the input ranges. The table below details the input ranges and resolutions for the available input configurations and gains.

Bipolar		Unipolar		
Range	Resolution	Range	Resolution	
±10V	4.88 mV	0 - 10V	2.44 mV	
±5V	2.44 mV	0 - 5V	1.22 mV	
±2.5V	1.22 mV	0-2.5V	0.61 mV	
±1.25V	0.61 mV	0-1.25V	305 uV	

Burst Mode

Channel-to-channel skew is the result of multiplexing the A/D inputs and is defined as the time between consecutive samples. For example, if four channels are sampled at a rate of 1 kHz per channel, the channel skew is $250 \,\mu s$ (1 ms/4).

Burst mode minimizes channel-to-channel skew by clocking the A/D at the maximum rate between successive channels. For example, at the 1-ms pulse channel 0 is sampled, channel 1 is sampled 3 μs later, channel 2, 3 μs after that, and channel 3, 3 μs after that. Then no samples are taken until the next 1-ms pulse, when channel 0 is sampled again. In this mode the rate for all channels is 1 kHz, but the channel-to-channel skew (delay) is now 3 μs , or 9 μs total. The minimum burst mode skew/delay on the PCI-DAS1200 is 3 us.



Burst Mode Timing Diagram

Analog Outputs

The PCI-DAS1602/12 provides two channels of high speed 12-bit analog output. The analog outputs are updated via an on-board FIFO and REP OUTSW commands and provide a $250\,\mathrm{kHz}$ maximum update rate. Software selectable output ranges of 0-10V, 0-5V, \pm 10V and \pm 5V are provided, and channels may be set at different ranges. The D/A outputs provide rated accuracy to \pm 5 mA, are short circuit protected (25 mA limit) and are cleared to 0 volts on power up or reset.

Parallel Digital I/O

The PCI-DAS1602/12 provide 24 bits of parallel, digital I/O in the form of two 8-bit ports, and two 4-bit ports. This digital capability is based on an on-board 82C55 PIA chip, which allows each of the ports to be set independently as input or output. On power up or reset, the ports default to the input state (high impedance).

Counter/Timer I/O

The PCI-DAS1602/12 provides one 16-bit down counter (one third of an 82C54 chip). The counter provides clock, gate and output connections. The Counter clock may also be connected to the on-board 10 MHz xtal oscillator or may be left uncommitted for user input.

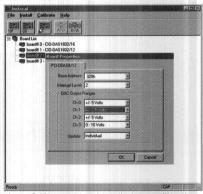
Installed in any PCI-bus compatible personal computer the PCI-DAS1602/12 turns your personal computer into a high speed data acquisition and control station suitable for laboratory data collection, instrumentation, production test, or industrial monitoring.

Software

All PCI-DAS1602/12 boards come complete with ComputerBoards' powerful *Insta*Cal[™] software package. *Insta*Cal is a complete installation, calibration and test program for ComputerBoards data acquisition and control boards. Complete with extensive error checking, *Insta*Cal guides you through installation and setup of your data acquisition board and creates the board configuration file for use by

your program or application software package. *Insta*Cal is described in detail within the software section of this handbook.

The PCI-DAS1602/12 boards are fully supported by ComputerBoards' powerful UniversalLibrary. Universal Library is a complete set of I/O libraries and drivers for all of our boards, for all Windows based languages. When using the Universal Library you



InstaCAL provides installation, calibration and test functions for all of our boards!

can switch boards or even programming languages and the syntax remains constant. Want to change programming languages? The UniversalLibrary requires no relearning. For details on Universal Library, please refer to the software section of this handbook.

The PCI-DAS1602/12 boards are fully supported by a wide variety of applications software packages including SoftWIRE $^{\text{\tiny TM}}$, DAS-Wizard $^{\text{\tiny TM}}$, (and DAS-Wizard Pro $^{\text{\tiny TM}}$), HP VEE $^{\text{\tiny RM}}$, HP VEE Lab and LabVIEW $^{\text{\tiny TM}}$. For further details on these, as well as a variety of other software packages, please refer to the software section provided earlier in this catalog.

PCI-DAS1602/12 Specifications

Analog input section

Resolution

Programmable ranges

 $\pm 10V$, $\pm 5V$, $\pm 2.5V$, $\pm 1.25V$,

0 - 10V, 0 - 5V, 0 - 2.5V, 0 - 1.25V

A/D pacing

Programmable:

internal counter or external source

Burstmode

(A/D External Pacer) or sw polled Software selectable option, rate = 3μ s

A/D Trigger sources

External analog or digital

A/D Triggering Modes

Digital: SW configurable for Edge (triggered) or level-activated (gated). Programmable polarity (rising/falling edge, high/low gate). Analog: SW configurable for above/below reference, in/out window and hysteresis. Programmable polarity (rising/falling edge trigger, high/low gate). Trigger levels set by DAC0 and/or DAC1. Pre-trigger: Unlimited pre- and post-trigger samples. Total # of samples must be > 512. Compatible with Digital and Analog trigger

Data transfer mode

From 1024 sample FIFO via REPINSW,

interrupt or software polled

Polarity

Unipolar/Bipolar, software selectable

8 diff. or 16 SE, software selectable Number of channels

A/D conversion time

Throughput

330kHz min

Input settling time

No missing codes

CMRR @ 60Hz

3.0 uS max (to 0.01% at any gain)

Relative Accuracy

±1.5LSB Differential Linearity error ±0.75 LSB

Integral Linearity error Gain Error

±0.5 LSB typ, ±1.5 LSB max ± 0.02% of reading Max 12 bits (guaranteed) ±6ppm/°C

Gain drift (A/D specs) Zero drift (A/D specs) Common Mode Range

±1ppm/°C ±10V 70dB

Input leakage current Input impedance

200nA 10Meg Ohms Min

Maximum input voltage

Analog Output:

Resolution 12 bits Number of channels

Output Ranges

±10V, ±5V, 0-5V, 0-10V. Each

D/A pacing

channel independently programmable. Internal or external clock, or Software

controlled.

Data transfer

REP OUTSW with 1K FIFO

Offset error

±600μV max, all ranges (calibrated) ±2 LSB (calibrated)

Gain error Differential nonlinearity

±1 LSB max ±1 LSB max

Integral nonlinearity Monotonicity D/A Gain drift

Throughput

12 bits ±5 ppm/°C max ±5 ppm/°C max

D/A Bipolar offset drift D/A Unipolar offset drift

±5 ppm/°C max 250 kHz max (on each channel)

4µs typ (to .01% of 10V step)

Settling time Slew Rate Current Drive Output short-circuit duration

35V/uS ±5 mA min 25 mA indefinite DC / 0.1 Ohms max

Output Coupling/impedance Miscellaneous

DAC's cleared to 0 volts, ±200mV

on power up or reset

Digital Input / Output

82C55A Digital Type

Configuration

2 banks of 8, 2 banks of 4,

programmable by bank as input or output

24 I/O

Logic Levels

Output High Output Low

Number of channels

3.0 volts @ -2.5mA min 0.4volts @ 2.5 mA max

Input High 2.0 volts min, Vcc+0.5 volts abs max Input Low 0.8 volts max, GND-0.5 volts abs min

Power-up / reset state

Input mode (high impedance)

Interrupts

INTA# - mapped to IRQn via PCI BIOS Programmable

Interrupt enable Interrupt sources

Residual counter, End-of-channel-scan,

AD-FIFO-not-empty, AD-FIFO-half-full

Counter section

Configuration Two 82C54s with three 16-BIT down counters per 82C54 82C54A:

Counter 0 - ADC residual sample counter

Source:

ADC Clock

Gate: Internal programmable source End-of-Acquisition interrupt Output:

Counter 1 - ADC Pacer Lower Divider

10 MHz oscillator Source:

Gate: Tied to Counter 2 gate, programmable source

Output: Chained to Counter 2 Clock

Counter 2 - ADC Pacer Upper Divider Source: Counter 1 Output

Gate:

Tied to Counter 1 gate, programmable source Output: ADC Pacer clock (if software selected),

available at user connector

82C54B:

Counter 0 - Pretrigger Mode

Source: Gate:

ADC Clock.

External trigger Output: End-of-Acquisition interrupt.

Counter 0 - Non-Pretrigger Mode - User Counter 4 Source:

User input at 100pin connector (CLK4) or

internal 10MHz (software selectable) User input at 100pin connector (GATE4)

Gate: Available at 100pin connector (OUT4) Output:

Counter 1 - DAC Pacer, Lower Divider Source: 10 MHz on-board oscillator

Gate: Tied to counter 2 Gate Chained to Counter 2 Clock Output: Counter 2 - DAC Pacer, Upper Divider

Source: Counter 1 Output Gate: Tied to Counter 1 Gate

Output:

DAC Pacer Clock (available at I/O connector)

Clock input frequency 10Mhz max High pulse width (clk input) 30ns min Low pulse width (clk input) 50ns min Gate width high or low 50ns min Input low voltage 0.8V max Input high voltage 2.0V min Output low voltage 0.4V max Output high voltage 3.0V min

Power consumption

+5V +12 V 1.2A typical, 1.5A max

30 mA max

Environmental

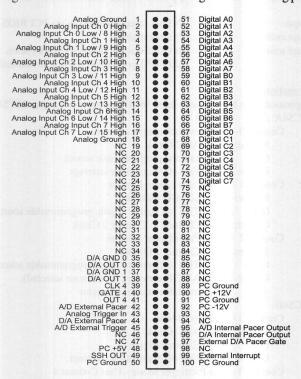
Operating temp range Storage temp range

0 to 70°C -40 to 100°C

Humidity 0 to 90% non-condensing

I/O Connector & Cables

All I/O signals are brought through a 100-pin high-density connector. The (optional) C100FF-XX series cable splits the 100 pins into two seperate 50-pin cables. The first 50-pin cable contains the signals from pins 1-50, while the second carries pins 51-100 and keeps the analog signals in one cable and the digital in another. This configuration minimizes noise in the analog signal lines and greatly simplifies field wiring as well as connections to external signal conditioning products.



Auto-Calibration / Self-Calibration

In keeping with general plug-and-play standards, the PCI-DAS1602/12 board has no switches, jumpers or potentiometers. *Auto-calibration* is performed with digital potentiometers and/or trim D/A converters. Unlike some boards that use software lookup tables for post-acquisition error correction, the PCI-DAS1602/12 board's data is accurate when written into your computer's memory.

The calibration factors that control the digital trim components are stored in EEPROM on the board. You can remove the board from one computer, install it in another, and it will still provide calibrated data.

In addition to being auto-calibrating, the PCI-DAS1602/12 board is self-calibrating. Standard calibration techniques require a channel to be calibrated with zero volts input (offset calibration) and with a known input voltage (gain calibration). The PCI-DAS1602/12 provides on-board circuitry that will short the inputs allowing offset calibration, and then connect the inputs to an ultra-stable, on-board voltage reference for the gain calibration. A complete PCI-DAS1602/12 calibration is as simple as issuing a single software command.

For a complete discussion of ComputerBoards unique and powerful auto-calibration and self-calibration techniques, please refer to our Auto- and Self-Calibration tutorial on page 270.

Signal Conditioning & Accessories

Analog Signal Conditioning





ISO-RACK16/P* 16-channel ISO-5B module rack connects an ISO-

5B module to each analog input channel.

ISO-DA02/P* 2-channel ISO-5B module rack connects a ISO-5B

module to each analog output channel.

Digital Signal Conditioning (requires DADP-5037 adaptor)





CIO-ERB24* 24 channel relay rack with 6 Amp, Form C relays CIO-SERB24* 24 channel relay rack with 10 Amp, socketed and

field replacable Form C relays.

SSR-RACK24* 24 channel solid state I/O module rack.

BNC Connector Interface Boxes



BNC-16SE BNC interface box for 16 channel single-ended

mode. Brings each channel out to a BNC connector. BNC interface box for 8 channel differential mode.

Each channel has a seperate + and - BNC connector.

Screw Terminal Accessory Boards and Boxes



BNC-16DI

SCB-Series & CIO-MINI-Series
The main 100-pin connector is compatible with C100FF-03 series cables and the SCB-50 screw connection box (1 required for all 100 connections) or CIO-MINI50

screw terminal board (2 required).

*Items denoted with an asterisk are available with detachable screw terminals. These terminals simplify field wiring and board replacements. To specify detachable screw terminals simply add a /DST suffix to the part number (e.g. CIO-MINI50/DST or CIO-ERB24/DST).

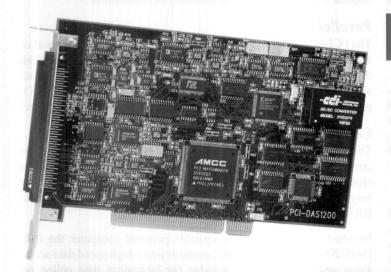
Ordering Guide

PCI-DAS1602/12

16-channel, 330-kHz, 12-bit A/D, D/A & high-current digital I/O board for PCI-bus computers.

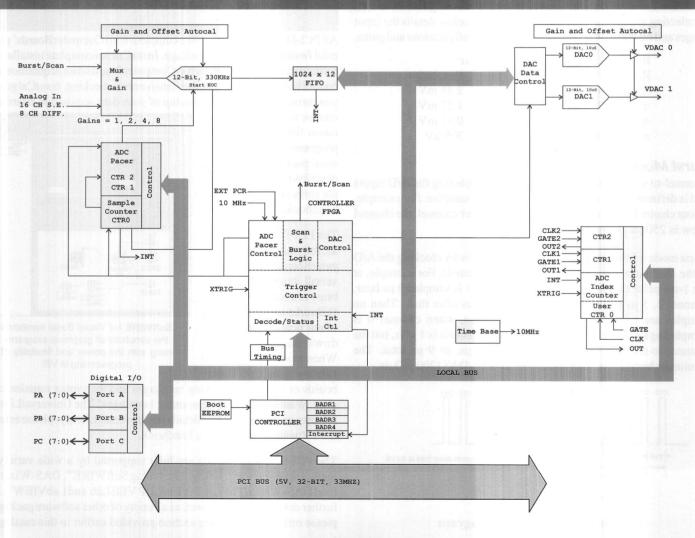
PCI-DAS1200 & PCI-DAS1200/JR

High-Speed PCI-bus Compatible, 16-Channel Analog Input Board with Dual Analog Output Channels & 24 Digital I/O bits



Features

- 16 channel SE/8 channel diff.
- 12-bit A/D resolution
- 330-kHz sample rate
- Burst-Mode SS&H emulation
- 1024 sample FIFO
- Dual 12-bit D/As (no D/As on /JR model)
- Three 16-bit counters
- 24-bits digital I/O
- Fully Plug-and-Play
- Fully Autocalibrating



tiometers and trim D/A converters. (For more details on our digital calibration techniques, please see our calibration tutorial on page 270).

Analog Inputs

The PCI-DAS1200 provides 8 fully differential or 16 single-ended analog inputs. The input mode is software selectable, with no switches or jumpers to set. The board offers a 330 kHz maximum sample rate in single and multichannel scans at any gain setting. A 1024 sample FIFO assures data taken from the board is transferred into computer memory without the possibility of missed samples.

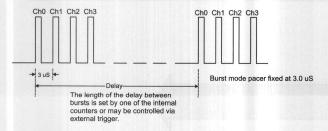
Software also selects the bipolar/unipolar input configuration as well as selecting among the input ranges. The table below details the input ranges and resolutions for the available input configurations and gains.

Bipolar		Unipolar			
Range	Resolution	Range	Resolution		
±10V	4.88 mV	0 - 10V	2.44 mV		
±5V	2.44 mV	0 - 5V	1.22 mV		
±2.5V	1.22 mV	0-2.5V	0.61 mV		
±1.25V	0.61 mV	0-1.25V	305 uV		

Burst Mode

Channel-to-channel skew is the result of multiplexing the A/D inputs and is defined as the time between consecutive samples. For example, if four channels are sampled at a rate of 1 kHz per channel, the channel skew is $250 \,\mu s$ (1 ms/4).

Burst mode minimizes channel-to-channel skew by clocking the A/D at the maximum rate between successive channels. For example, at the 1-ms pulse channel 0 is sampled, channel 1 is sampled 3 μ s later, channel 2, 3 μ s after that, and channel 3, 3 μ s after that. Then no samples are taken until the next 1-ms pulse, when channel 0 is sampled again. In this mode the rate for all channels is 1 kHz, but the channel-to-channel skew (delay) is now 3 μ s, or 9 μ s total. The minimum burst mode skew/delay on the PCI-DAS1200 is 3 us.



Burst Mode Timing Diagram

The PCI-DAS1200 and PCI-DAS1200/JR provide three 16-bit down counters. The counters are based on an 82C54 chip, which provides clock, gate and output connections for each counter. The CTR4 clock may be connected to the on-board 10 MHz xtal oscillator or may be left uncommitted for user input.

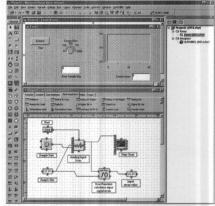
Installed in any PCI-bus compatible personal computer the PCI-DAS1200 turns your personal computer into a high speed data acquisition and control station suitable for laboratory data collection, instrumentation, production test, or industrial monitoring.

Software

All PCI-DAS1200 boards come complete with ComputerBoards' powerful *Insta*CalTM software package. *Insta*Cal is a complete installation, calibration and test program for ComputerBoards data acquisition and control boards. Complete with extensive error checking, *Insta*Cal guides you through installation and setup of your data acquisition board and

creates the board configuration file for use by your program or application software package. *Insta*Cal is described in detail within the software section of this handbook.

The PCI-DAS1200 boards are fully supported by ComputerBoards' powerful UniversalLibrary. Universal Library is a complete set of I/Olibraries and drivers for all of our boards, for all Windows based languages. When using the Universal Library you can switch



SoftWIRE for Visual Basic combines the simplicity of graphical programming with the power and flexibility of programming in VB!

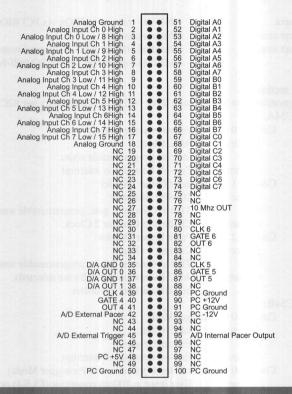
boards or even programming languages and the syntax remains constant. Want to change programming languages? The UniversalLibrary requires no relearning. For details on Universal Library, please refer to the software section of this handbook.

		Digital Input / Output		
	interrupt or software polled	82C54A:		
		Counter 0 - ADC 1	residual sample counter	
Polarity	Unipolar/Bipolar, software selectable	Source:	ADC Clock	
Number of channels	8 diff. or 16 SE, software selectable	Gate:	Internal programmable sourc.	
		Output:	End-of-Acquisition interrupt	
A/D conversion time	3µs	Counter 1 - ADC 1	Pacer Lower Divider	
Throughput	330kHz min	Source:	10 MHz oscillator	
Input settling time	3.0 uS max (to 0.01% at any gain)	Gate:	Tied to Counter 2 gate, programma	able source
			Chained to Counter 2 Clock.	
Relative Accuracy	±1.5LSB	Counter 2 - ADC	Pacer Upper Divider	
Differential Linearity error	±0.75 LSB		Counter 1 Output	
Integral Linearity error	± 0.5 LSB typ, ± 1.5 LSB max		Tied to Counter 1 gate, programma	able source
Gain Error	± 0.02% of reading Max		ADC Pacer clock (if software select	
No missing codes	12 bits (guaranteed)	1	available at user connector	otea),
Gain drift (A/D specs)	±6ppm/°C	82C54B:	available at ager connector	
Zero drift (A/D specs)	±1ppm/°C	Counter 0 - Pretrig	gger Mode	
			ADC Clock.	
Common Mode Range	±10V		External trigger	
CMRR @ 60Hz	70dB		End-of-Acquisition interrupt.	
Input leakage current	200nA		Counter 4 (when in non-Pretrigger I	Moda)
Input impedance	10Meg Ohms Min			
Maximum input voltage	±35V		User input at 100pin connector (Cl	
m ment was a	233 (internal 10MHz (software selectab	
Analog Output:			User input at 100pin connector (G.	
D/A type	AD7847AR		Available at 100pin connector (OU	114)
Resolution	12 bits	Counter 1 - User C		
Number of channels	2	Source:	User input at 100pin connector (Cl	LK5)
			User input at 100pin connector (Ga	
Output Ranges	±10V, ±5V, 0-5V, 0-10V. Each	1	Available at 100pin connector (OU	JT5)
	channel independently programmable.	Counter 2 - User C		1100 110
D/A pacing	Software		User input at 100pin connector (CI	
Data transfer	Programmed I/O.		User input at 100pin connector (Ga	
Data transfer	1 Togrammed 1/O.	Output:	Available at 100pin connector (OU	JT6)
Offset error	±600μV max, all ranges (calibrated)			
Gain error	±0.02% FSR max (calibrated)	Clock input frequency	10Mhz max	
Differential nonlinearity	±1LSB max	High pulse width (clk input)		
Integral nonlinearity	±1LSB max	Low pulse width (clk input)		
Monotonicity	12 bits	Gate width high or low	50ns min	
D/A Gain drift	±2 ppm/°C max	Input low voltage	0.8V max	
D/A Bipolar offset drift	±5 ppm/°C max	Input high voltage	2.0V min	
D/A Unipolar offset drift	±5 ppm/°C max	Output low voltage	0.4V max	
DIA Chipolai oriset unit	±3 ppin/ C max	Output high voltage	3.0V min	
Throughput	PC dependent			
Settling time	4μs typ (to .01% of 10V step)	Power consumption		
Slew Rate	7V/µS	+5V Operating	0.8A typical, 1.0A max	
Current Drive	±5 mA min	771	6/5	
Output short-circuit duration	25 mA indefinite	Environmental		
	DC	Operating temp range	0 to 70°C	
Output Coupling		Storage temp range	-40 to 100°C	
Amp Output Impedance	0.1 Ohms max	Humidity	0 to 90% non-condensing	
Miscellaneous	DAC's cleared to 0 volts, ±200mV	<u>.</u>		

on power up or reset

I/O Connector & Cables

All I/O signals are brought through a 100-pin high-density connector. The (optional) C100FF-XX series cable splits the 100 pins into two seperate 50-pin cables. The first 50-pin cable contains the signals from pins 1-50, while the second carries pins 51-100 and keeps the analog signals in one cable and the digital in another. This configuration minimizes noise in the analog signal lines and greatly simplifies field wiring as well as connections to external signal conditioning products.



Auto-Calibration / Self-Calibration

In keeping with general plug-and-play standards, the PCI-DAS1200 boards have no switches, jumpers or potentiometers. *Auto-calibration* is performed with digital potentiometers and/or trim D/A converters. Unlike some boards that use software lookup tables for post-acquisition error correction, the PCI-DAS1200 boards' data is accurate when written into your computer's memory.

The calibration factors that control the digital trim components are stored in EEROM on the board. You can remove the board from one computer, install it in another, and it will still provide calibrated data.

In addition to being auto-calibrating, the PCI-DAS1200 boards are also self calibrating. Standard calibration techniques require a channel to be calibrated with zero volts input (offset calibration) and with a known input voltage (gain calibration). The PCI-DAS1200 provides on-board circuitry that will short the inputs allowing offset calibration, and then connect the inputs to an ultra-stable, on-board voltage reference for the gain calibration. A complete PCI-DAS1200 calibration is as simple as issuing a single software command.

For a complete discussion of ComputerBoards unique and powerful auto-calibration and self-calibration techniques, please refer to our Auto- and Self-Calibration tutorial on page 270.

Signal Conditioning & Accessories

Analog Signal Conditioning





ISO-RACK16/P* 16-channel ISO-5B module rack connects an ISO-

5B module to each analog input channel.

ISO-DA02/P* 2-channel ISO-5B module rack connects a ISO-5B

module to each analog output channel.

Digital Signal Conditioning (requires DADP-5037 adaptor)



CIO-ERB24* 24 channel relay rack with 6 Amp, Form C relays CIO-SERB24* 24 channel relay rack with 10 Amp, socketed and

field replacable Form C relays.

SSR-RACK24* 24 channel solid state I/O module rack.

BNC Connector Interface Boxes



BNC-16SE BNC interface box for 16 channel single-ended

mode. Brings each channel out to a BNC connector.

BNC-16DI BNC interface box for 8 channel differential mode. Each channel has a seperate + and - BNC connector.

Screw Terminal Accessory Boards and Boxes

SCB-Series & CIO-MINI-Series

The main 100-pin connector is compatible with C100FF-03 series cables and the SCB-50 screw connection box (1 required for all 100 connections) or CIO-MINI50 screw terminal board (2 required).

* Items denoted with an asterisk are available with detachable screw terminals. These terminals simplify field wiring and board replacements. To specify detachable screw terminals simply add a /DST suffix to the part number (e.g. CIO-MINI50/DST or CIO-ERB24/DST).



Ordering Guide

PCI-DAS1200

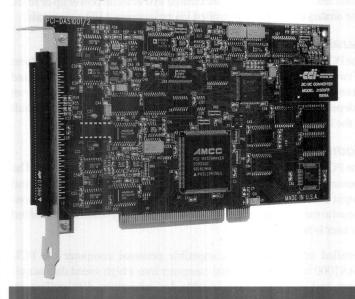
16-channel, 330kHz, 12-bit A/D, D/A & digital I/O board for PCI-bus computers.

PCI-DAS1200/JR

16-channel, 330kHz, 12-bit A/D & digital I/O board for PCI-bus computers.

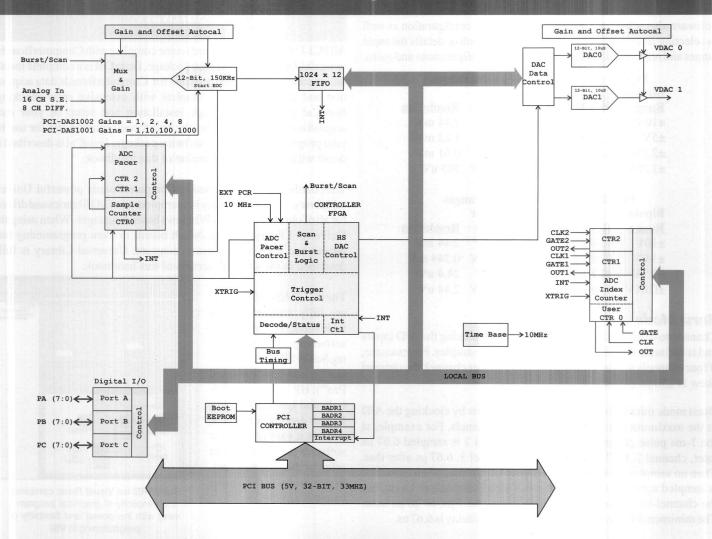
PCI-DAS1000 Series

Medium-Speed PCI-bus Compatible, 16-Channel Analog Input Board with Dual Analog Output Channels & 24 Digital I/O bits



Features

- 16 channel SE / 8 channel diff.
- 12-bit A/D resolution
- Gains of 1, 2, 4, 8 PCI-DAS1002 & PCI-DAS1000
 Gains of 1, 10, 100, 1000 PCI-DAS1001
- 250 / 200 kHz sample rate PCI-DAS1000 / 1002
 150 kHz sample rate PCI-DAS1001
- Burst-Mode SS&H emulation
- 1024 sample FIFO
- Dual 12-bit D/As (none on PCI-DAS1000)
- 24-bits digital I/O, three 16-bit counters
- Fully Autocalibrating & plug-and-play



Functional Description

The PCI-DAS1000 series multifunction analog and digital I/O boards set a new standard for low cost, medium speed data acquisition on the PCI-bus. Offering 16 single-ended or 8 differential 12-bit analog inputs with sample rates up to 250 kHz (PCI-DAS1000), 200 kHz (PCI-DAS1002), 150 kHz (PCI-DAS1001), 24 bits of digital I/O, three 16-bit down counters. In addition, the PCI-DAS1002 and PCI-DAS1001 offer two 12-bit analog outputs. The only difference between the booards are the analog input ranges provided. The PCI-DAS1002 & PCI-DAS1000 offer input gains of 1, 2, 4 and 8 while the PCI-DAS1001 offers gains of 1, 10, 100, and 1000.

The PCI-DAS 1000 is completely plug-and-play. There are no switches, jumpers or potentiometers on the board. All board addresses, interrupt channels etc. are set by your computer's plug-and-play software. Even calibration is performed via software by using on-board digital potentiometers and trim D/A converters. (For more details on our digital calibration techniques, please see our calibration tutorial on page 270).

Analog Inputs

The PCI-DAS1000 series provides 8 fully differential or 16 single-ended analog inputs. The input mode is software selectable, with no switches or jumpers to set. The boards offer a 250 - 150 kHz maximum sample rate in single and multichannel scans at any gain setting. A 1024 sample FIFO assures data taken from the board is transferred into computer memory without the possibility of missed samples.

Software also selects the bipolar/unipolar input configuration as well as selecting among the input ranges. The table below details the input ranges and resolutions for the available input configurations and gains.

Bipolar		Unipolar	
Range	Resolution	Range	Resolution
±10V	4.88 mV	0 - 10V	2.44 mV
±5V	2.44 mV	0 - 5V	1.22 mV
±2.5V	1.22 mV	0-2.5V	0.61 mV
±1.25V	0.61 mV	0-1.25V	305 uV

PCI-DAS1001 analog input ranges

Bipolar		Unipolar	
Range	Resolution	Range	Resolution
±10V	4.88 mV	0 - 10V	2.44 mV
±1.0V	0.488 mV	0 - 1.0V	0.244 mV
±0.1V	48.8 uV	0-0.1V	24.4 uV
±0.01V	4.88 uV	0-0.01V	2.44 uV

Burst Mode

Channel-to-channel skew is the result of multiplexing the A/D inputs and is defined as the time between consecutive samples. For example, if four channels are sampled at a rate of 1 kHz per channel, the channel skew is 250 µs (1 ms/4).

Burst mode minimizes channel-to-channel skew by clocking the A/D at the maximum rate between successive channels. For example, at the 1-ms pulse channel 0 is sampled, channel 1 is sampled 6.67 μs later, channel 2, 6.67 μs after that, and channel 3, 6.67 μs after that. Then no samples are taken until the next 1-ms pulse, when channel 0 is sampled again. In this mode the rate for all channels is 1 kHz, but the channel-to-channel skew (delay) is now 6.67 μs , or 20 μs total. The minimum PCI-DAS1000 burst mode skew/delay is 6.67 us.

Analog Outputs

The PCI-DAS1001 and PCI-DAS1002 provide two channels of 12-bit analog output. Software selectable output ranges of 0-10V, 0-5V, \pm 10V and \pm 5V are provided, and channels may be set at different ranges. The D/A outputs provide rated accuracy to \pm 5 mA, are short circuit protected (25 mA limit) and are cleared to 0 volts on power up or reset. The analog outputs are controlled via programmed I/O commands.

Parallel Digital I/O

The PCI-DAS1000 series provide 24 bits of parallel, digital I/O in the form of two 8-bit ports, and two 4-bit ports. This digital capability is based on an on-board 82C55 PIA chip, which allows each of the ports to be set independently as input or output. On power up or reset, the ports default to the input state (high impedance).

Counter/Timer I/O

The PCI-DAS1000 series also provide three 16-bit down counters. The counters are based on an 82C54 chip, which provides clock, gate and output connections for each counter. The CTR4 clock may be connected to the on-board 10 MHz xtal oscillator or may be left uncommitted for user input.

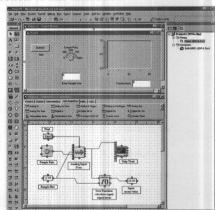
Installed in any PCI-bus compatible personal computer the PCI-DAS1000 turns your personal computer into a high speed data acquisition and control station suitable for laboratory data collection, instrumentation, production test, or industrial monitoring.

Software

All PCI-DAS1000 series boards come complete with ComputerBoards' powerful *Insta*CalTM software package. *Insta*Cal is a complete installation, calibration and test program for ComputerBoards data acquisition and control boards. Complete with extensive error checking, *Insta*Cal guides you through installation and setup of your data acquisition board and creates the board configuration file for use by your program or application software package. *Insta*Cal is described in detail within the software section of this handbook.

The boards are fully supported by ComputerBoards' powerful Universal Library. Universal Library is a complete set of I/O libraries and drivers for all of our boards, for all Windows based languages. When using the Universal Library you can switch boards or even programming languages and the syntax remains constant. Universal Library is fully described in the software section of this handbook.

The PCI-DAS-1000 boards are fully supported by a wide variety of applications software packages including SoftWIRE™, DAS-Wizard™, (and DAS-Wizard Pro™), HP VEE®, HP VEE Lab and LabVIEW™. For further details on these, as well as a variety of other software packages, please refer to the software section provided earlier in this catalog.



SoftWIRE for Visual Basic combines the simplicity of graphical programming with the power and flexibility of programming in VB!

PCI-DAS1000 Series Specifications Analog input section A/D converter type ADS7800 12 bits Resolution ±10V, ±5V, ±2.5V, ±1.25V, DAS1002/1000 input ranges 0 - 10V, 0 - 5V, 0 - 2.5V, 0 - 1.25V PCI-DAS1001 input ranges $\pm 10V$, $\pm 1.0V$, $\pm 0.1V$, $\pm 0.01V$, 0 - 10V, 0 - 1V, 0 - 0.1V, 0 - 0.01V A/D pacing Programmable: internal counter or external source (A/D External Pacer) or sw polled Burstmode Software selectable option, rate = 3μ s A/D Trigger sources External digital (A/D External Trigger) A/D Triggering Modes Digital: Software enabled, rising edge Pre-trigger: Unlimited pre- and post-trigger samples. Total samples must be > 512. Data transfer mode From 1024 sample FIFO via REPINSW, interrupt or software polled Polarity Unipolar/Bipolar, software selectable Number of channels 8 diff. or 16 SE, software selectable A/D conversion time 3µs Throughput 200 kHz min, PCI-DAS1002 150 kHz min, PCI-DAS1001 250 kHz min, PCI-DAS1000 Input settling time 2.5 uS max (to 0.01% at any gain) Relative Accuracy ±1.5LSB Differential Linearity error ±0.75 LSB Integral Linearity error ±0.5 LSB typ, ±1.5 LSB max Gain Error ± 0.02% of reading Max No missing codes 12 bits (guaranteed) Gain drift (A/D specs) ±6ppm/°C Zero drift (A/D specs) ±1ppm/°C Common Mode Range ±10V CMRR @ 60Hz 70dB Input leakage current 200nA Input impedance 10Meg Ohms Min Maximum input voltage Analog Output: (none on PCI-DAS1000) AD7847AR D/A type Resolution 12 bits Number of channels **Output Ranges** ±10V, ±5V, 0-5V, 0-10V. Each channel independently programmable. D/A pacing Software Data transfer Programmed I/O. Offset error ±600μV max, all ranges (calibrated) ±0.02% FSR max (calibrated) Gain error Differential nonlinearity ±1LSB max Integral nonlinearity ±1LSB max

Monotonicity 12 bits D/A Gain drift ±2 ppm/°C max D/A Bipolar offset drift ±5 ppm/°C max D/A Unipolar offset drift ±5 ppm/°C max Throughput PC dependent Settling time 4µs typ (to .01% of 10V step) Slew Rate 7V/µS Current Drive ±5 mA min Output short-circuit duration 25 mA indefinite Output Coupling/Impedance DC / 0.1 Ohms, max. Miscellaneous DAC's cleared to 0 volts, ±200mV on power up or reset

Digital Input / Output Digital Type 82C55A 2 banks of 8, 2 banks of 4, Configuration programmable by bank as input or output Number of channels Logic Levels Output High 3.0 volts @ -2.5mA min **Output Low** 0.4volts @ 2.5 mA max Input High 2.0 volts min, Vcc+0.5 volts abs max Input Low 0.8 volts max, GND-0.5 volts abs min Power-up / reset state Input mode (high impedance) INTA# - mapped to IRQn via PCI BIOS Interrupts Interrupt enable Programmable Interrupt sources Residual counter, End-of-channel-scan, AD-FIFO-not-empty, AD-FIFO-half-full Counter section Configuration Two 82C54s with three 16-BIT down counters per 82C54 82C54A: Counter 0 - ADC residual sample counter Source: ADC Clock Internal programmable source Gate: Output: End-of-Acquisition interrupt Counter 1 - ADC Pacer Lower Divider Source: 10 MHz oscillator Gate: Tied to Counter 2 gate, programmable source Output: Chained to Counter 2 Clock Counter 2 - ADC Pacer Upper Divider Source: Counter 1 Output Gate: Tied to Counter 1 gate, programmable source. Output: ADC Pacer clock (if software selected), available at user connector 82C54B: Counter 0 - Pretrigger Mode ADC Clock. Source: Gate: External trigger Output: End-of-Acquisition interrupt Counter 0 - User Counter 4 (when in non-Pretrigger Mode) User input at 100pin connector (CLK4) or Source: internal 10MHz (software selectable) Gate: User input at 100pin connector (GATE4) Output: Available at 100pin connector (OUT4) Counter 1 - User Counter 5 Source: User input at 100pin connector (CLK5) User input at 100pin connector (GATE5) Gate: Output: Available at 100pin connector (OUT5) Counter 2 - User Counter 6 Source: User input at 100pin connector (CLK6) Gate: User input at 100pin connector (GATE6) Output: Available at 100pin connector (OUT6) Clock input frequency 10Mhz max High pulse width (clk input) 30ns min Low pulse width (clk input) 50ns min

Gate width high or low 50ns min Input low voltage 0.8V max Input high voltage 2.0V min Output low voltage 0.4V max Output high voltage 3.0V min

Power consumption +5V Operating

0.8A typical, 1.0A max

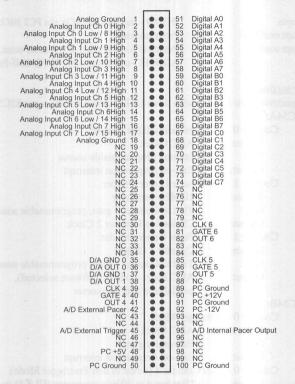
Environmental

0 to 70°C Operating temp range Storage temp range -40 to 100°C

Humidity 0 to 90% non-condensing

I/O Connector & Cables

All I/O signals are brought through a 100-pin high-density connector. The (optional) C100FF-XX series cable splits the 100 pins into two seperate 50-pin cables. The first 50-pin cable contains the signals from pins 1-50, while the second carries pins 51-100 and keeps the analog signals in one cable and the digital in another. This configuration minimizes noise in the analog signal lines and greatly simplifies field wiring as well as connections to external signal conditioning products.



Auto-Calibration / Self-Calibration

In keeping with general plug-and-play standards, the PCI-DAS1000 series boards have no switches, jumpers or potentiometers. *Auto-calibration* is performed with digital potentiometers and/or trim D/A converters. Unlike some boards that use software lookup tables for post-acquisition error correction, the PCI-DAS1000 boards' data is accurate when written into your computer's memory.

The calibration factors that control the digital trim components are stored in EEROM on the board. You can remove the board from one computer, install it in another, and it will still provide calibrated data.

In addition to being auto-calibrating, the PCI-DAS1000 boards are also self calibrating. Standard calibration techniques require a channel to be calibrated with zero volts input (offset calibration) and with a known input voltage (gain calibration). The PCI-DAS1000 provides on-board circuitry that will short the inputs allowing offset calibration, and then connect the inputs to an ultra-stable, on-board voltage reference for the gain calibration. A complete PCI-DAS1000 series calibration is as simple as issuing a single software command.

For a complete discussion of ComputerBoards unique and powerful auto-calibration and self-calibration techniques, please refer to our Auto- and Self-Calibration tutorial on page 270.

Signal Conditioning & Accessories

Analog Signal Conditioning





ISO-RACK16/P* 16-channel ISO-5B module rack connects an ISO-

5B module to each analog input channel.

ISO-DA02/P* 2-channel ISO-5B module rack connects a ISO-5B

module to each analog output channel.

Digital Signal Conditioning (requires DADP-5037 adaptor)





CIO-ERB24* 24 channel relay rack with 6 Amp, Form C relays CIO-SERB24* 24 channel relay rack with 10 Amp, socketed and

field replacable Form C relays.

SSR-RACK24* 24 channel solid state I/O module rack.

BNC Connector Interface Boxes



BNC-16SE BNC interface box for 16 channel single-ended

mode. Brings each channel out to a BNC connector.

BNC-16DI BNC interface box for 8 channel differential mode.
Each channel has a seperate + and - BNC connector.

Screw Terminal Accessory Boards and Boxes



SCB-Series & CIO-MINI-Series

The main 100-pin connector is compatible with C100FF-03 series cables and the SCB-50 screw connection box (1 required for all 100 connections) or CIO-MINI50 screw terminal board (2 required).

* Items denoted with an asterisk are available with detachable screw terminals.



Ordering Guide

PCI-DAS1002

16-channel, standard gain, 200kHz, 12-bit analog & digital I/O board for PCI-bus computers.

PCI-DAS1001

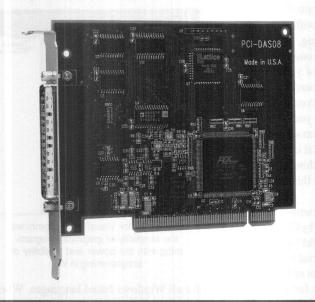
16-channel, high gain, 150 kHz, 12-bit analog & digital I/O board for PCI-bus computers.

PCI-DAS1000

16-channel, high gain, 250 kHz, 12-bit analog input & digital I/O board for PCI-bus computers.

PCI-DAS08

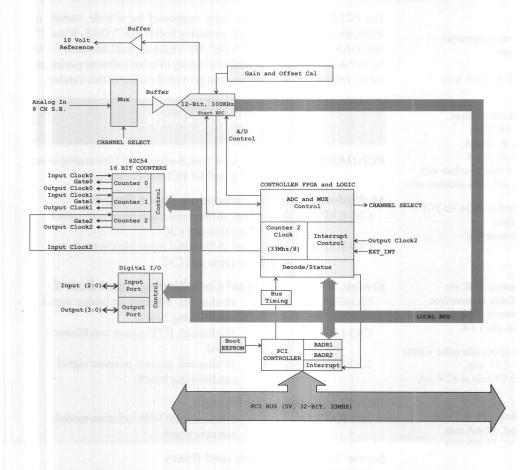
Low Cost, PCI-bus Compatible, 8-Channel Analog Input Board with 7 Digital I/O Bits and Three 16-bit Counters



Features

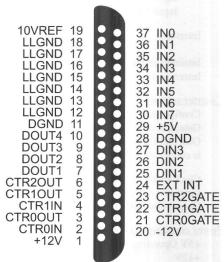
- Extremely low cost
- 8 Single ended analog inputs
- 12-bit A/D resolution
- ± 5 Volt input range
- 40 kHz sample rate
- Three 16-bit counters
- 7-bits digital I/O (4 out, 3 in)
- Connector compatible with CIO-DAS08
- Software register compatible with CIO-DAS08
- Fully plug-and-play

Block Diagram



I/O Connector & Cables

All I/O signals are brought through a 37-pin "D" connector. The (optional) C37FF-XX series cable brings all of the pins out and is suitable for use with all compatible screw terminal and signal conditioning accessory boards. The PCI-DAS08 connector pinout is identical to the standard ISA bus CIO-DAS08 and is fully compatible with the same wide assortment of signal conditioning accessory boards.



Functional Description

The PCI-DAS08 is a low cost analog input board for PCI bus compatible computers. Offering 8 single-ended 12-bit analog inputs with sample rates up to 50 kHz and A/D resolution of 2.44 mV. The board also provides 4 digital output bits, 3 digital input bits and three 16-bit down counters (in the form of a single 82C54). The PCI-DAS08 is connector and software compatible with ComputerBoards highly popular ISA based CIO-DAS08 board and is supported by the same wide variety of external signal conditioning products.

The PCI-DAS08 is completely plug-and-play. There are no switches, jumpers or potentiometers on the board. All board addresses, interrupt channels etc. are set by your computers plug-and-play software.

PCI-DAS08 Specifications

Analog input section

Resolution 12-bits (2.44 mV)
Input ranges ±5V
A/D pacing Software polled
Data transfer Software polled
Number of channels 8 single-ended

Number of channels 8 sing A/D conversion time 10µs

Throughput 40kHz typ. (PC dependant)

Relative Accuracy ±1LSB

Differential Linearity error No Missing Codes guaranteed

Integral Linearity error ±1 LSB
No missing codes guaranteed 12 bits
Gain drift (A/D specs) ±180ppm/°C
Zero drift (A/D specs) ±60ppm/°C

Input leakage current ±60 nA max over temperature

Input impedance 10Meg Ohms min

Absolute max. input voltage ±40V

VREF output +10.00V ±0.1V @ 2 mA max

Digital Input / Output

Configuration 3 fixed input, 4 fixed output
Output / Input chip 74ACT273 / 74LS244
Output High 3.94 volts min @ -24mA
Output Low 0.36 volts max @ 24mA
Input High 2.0 volts min, 7 volts absolute max
Input Low 0.8 volts max, -0.5 volts absolute min

Interrupts INTA# - mapped to IRQn via PCI
BIOS at boot-time

Interrupt enable External, Programmable

Interrupt sources External

Counter section

Configuration Three 16-bit down counters (82C54) Gate, Clk and Output of counter 0 and 1 are available at connector. Gate and Output of counter 2 is available at connector, CLK 2 is connected to a frequency divider set at PCI bus clock / 8.

Clock input frequency 10Mhz max (30ns min pulse width)
Input low / high 0.8V max / 2.0V min

Output low / high $0.4V \text{ max} / 3.0V \text{ min at } \pm 2.4 \text{ mA}$

Power consumption

+5V Operating 251 mA typical, 436 mA max +12V 13 mA typical, 19 mA max -12V 17 mA typical, 23 mA max

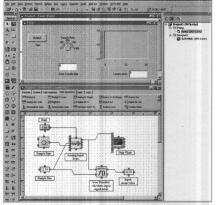
Environmental

Operating / Storage temp 0 to 50 °C / -20 to 70 °C Humidity 0 to 90% non-condensing

Software

All PCI-DAS08 series boards come complete with ComputerBoards' powerful *Insta*CalTM software package. *Insta*Cal is a complete installation, calibration and test program for ComputerBoards data acquisition

and control boards. Complete with extensive error checking, *Insta*Cal guides you through installation and setup of your data acquisition board and creates the board configuration file for use by your program or application software package. *Insta*Cal is described in detail within the software section of this handbook.



ds'
SoftWIRE for Visual Basic combines
the simplicity of graphical programming with the power and flexibility of
programming in VB!

The boards are fully supported by ComputerBoards' powerful UniversalLibrary. Universal Library is a complete set of I/O libraries and

drivers for all of our boards, for all Windows based languages. When using the Universal Library you can switch boards or even programming languages and the syntax remains constant. Universal Libraryis fully described in the software section of this handbook.

The PCI-DAS-08 boards are fully supported by a wide variety of applications software packages including SoftWIRE[™], DAS-Wizard[™], (and DAS-Wizard Pro[™]), HP VEE[®], HP VEE Lab and LabVIEW[™]. For further details on these, as well as a variety of other software packages, please refer to the software section provided earlier in this catalog.

Ordering Guide

PCI-DAS08 Low cost, 8-channel, 12-bit analog input board for PCI-bus computers.

Multiplexers and Thermocouple Input Boards

CIO-EXP32 32 channel, differential input Mux with switch selectable gains and CJC.

CIO-EXP-16 16 channel, differential input Mux with switch selectable gains and CJC.

Bridge, RTD & GP Signal Conditioning Input Boards

CIO-EXP-BRIDGE16 16 channel, Wheatstone bridge signal conditioning board.

CIO-EXP-RTD16 16 channel, RTD signal conditioning

board

CIO-EXP-GP 16 channel, general purpose signal conditioning board.

ISO-5B isolated Input Boards

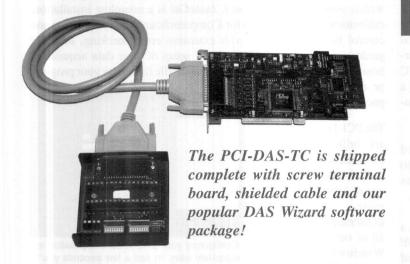
ISO-RACK08 8 channel, ISO-5B isolation module mounting rack.

Screw Terminal Boards and Boxes

CIO-MINI37 37 terminal, screw terminal board SCB-37 37 terminal, shielded screw terminal box

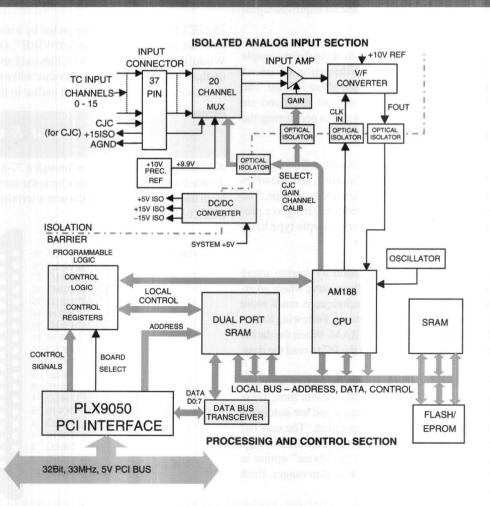
PCI-DAS-TC

16-Channel Thermocouple Input Board with Automatic Calibration, Cold-Junction Compensation, and Open-Channel Detection.



Features

- 16 Differential thermocouple input channels plus one CJC channel.
- Four programmable gain ranges
- Resolution to 0.03°C depends on conversion rate.
- Reads thermocouple types J, K, E, T, R, S, B.
- Conversion to degrees C or degrees F.
- Gain and Offset automatically calibrated on each scan.
- Cold Junction Compensation done on each scan.
- Overall Conversion rate 4.6 to 22.2 ms
- Provides 500 VDC isolation
- Fully Plug-and-Play



The PCI-DAS-TC also includes a copy of our popular DAS Wizard software package. DAS Wizard is an Excel add-in that allows you to configure and run your entire application from within Excel, and places your data directly into cells within your Excel spreadsheet.

The analog input section consists of a 16-channel input multiplexer, a CJC input, a programmable-gain amplifier, and a high frequency V/F based A/D converter. Input sample rates may be set to frequencies of 50Hz, 60Hz, or 400Hz. To minimize input noise, match the sample rate frequency to the frequency of the high-voltage power supplied in your area. This will take advantage of the A/D's integrating nature and remove most errors caused by ambient electronic noise. Also note that a lower sample rate produces higher resolution and an improved signal to noise ratio.

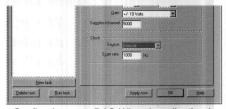
During each scan the A/D converter samples each of the thermocouple inputs, measures the CJC input, auto-calibrates the gain at a Gain = 1 using a reference voltage, and measures the input offset voltage. The CJC and the gain/offset values are stored in onboard RAM and are used by the processor in removing cold junction and in performing the built-in autocalibration.

As the thermocouple inputs are scanned, the processor first acquires the the raw data. It then calibrates it for gain/offset error, and linearizes it based on lookup tables for each associated thermocouple type. The processor then converts the data to temperature by referring to a previously-stored lookup table in ROM. Each thermocouple type has a separate table.

The use of lookup tables optimizes linearization by storing many reference points along the TC's temperature/voltage curve where greatest temperature/voltage changes occur. This technique is much more efficient than using lengthy polynomial calculations. Following linearization, the CPU loads the data in the dual port RAM. When the data is ready to be read, the CPU sends an interrupt to the PC to read the data.

The PCI-DAS-TC is shipped fully calibrated from the factory with calibration coefficients stored in nonvolatile RAM. At run time, these calibration factors are loaded into system memory and are automatically retrieved each time a different range is specified. The user has the option to recalibrate with respect to the factory-measured voltage standards at any time by simply selecting the "Calibrate" option in InstaCal. InstaCAL will calibrate all channels at all four ranges. Each channel takes under a minute to calibrate.

are fully supported by ComputerBoards' powerful Universal Library. Universal Library is a complete set of I/O libraries and drivers for all of our boards, in all Windows based languages. When using the Universal Library you can switch boards or even pro-



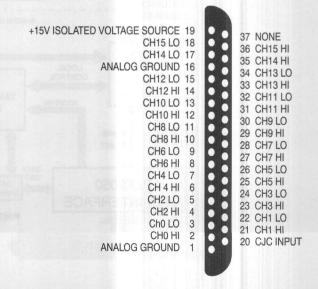
Configuring your DAS-Wizard application is extremely easy. In just a few seconds you'll click *Run Task* and your data will be placed directly into your Excel spreadsheet.

gramming languages and the syntax remains constant. For details on Universal Library, please refer to its User's Manual.

The PCI-DAS-TC is fully supported by a wide variety of applications software packages including SoftWIRE™, DAS-Wizard™, (and DAS-Wizard Pro™), HPVEE®, HPVEE Lab and LabVIEW™. For further details on these, as well as a variety of other software packages, please refer to the software section provided earlier in this catalog.

I/O Connector & Cables

All TC signals are brought in through a 37-pin connector. A C37FFS-5 cable then connects the connector to the screw terminal adaptor board. Both the shielded cable and the screw terminal board are included with the PCI-DAS-TC



Performance Specifications

Analog Input So	ection			Processor Reset -		On power-up, watchdog	
A/D converter type		AD652 V	V/F Converter	110ccssor Reset -		time-out, or s/w command	4
Accuracy & Resolution -Voltage M		easurements:		Watchdog timer -		1.6 seconds nominal.	
Gain	Range	Accuracy (\	Worst Case)	watchdog timer -		CPU resets watchdog af	ter hoot un
1	-2.5 to 10V	±.01% of read		Temperature units -		Programmable for convers	
125	-20 to 80mV	±.01% of read		remperature units	-	to degrees C or degrees F	SIOII
166.7	-15 to 60mV	±.01% of read		T., 4			
400	-6.25 to 25mV	±.02% of read		Interrupts		2, 3, 4, 5, 6 or 7; Interrup)[
100	0.23 to 2311 (2.0270 01 1000	g = 0.25μ ·	T		enable is programmable	
Resolution	@ 50Hz	@ 60Hz	@ 400Hz	Interrupt sources		Dual Port RAM when the	
Resolution	312.5µV	375µV	2.5mV	0 1 111		Processor Mailbox has da	
	2.5μV	3.0μV		Crystal oscillator		32 MHz; accuracy 100p	pm
			20.0μV				
	1.88µV	2.25µV	15.0μV	CIO-STA-TC Ada	apter		
	0.781μV	.938µV	6.25µV	CJC Type		AD592CN	
	1			Configuration		CJC on iso-thermal block	
		urements, not inclu				with the input screw term	ninals
TC Type	Range	Accuracy (V	Vorst Case)	Calibration error			
J	0 to 750°C	±0.5 °C		@25 °C		0.3°C typ, 0.5°C max	
K	-200 to 1250°C			-25°C to +105	5 °C	0.5°C typ, 1.0°C max	
E	-200 to 900°C	±1.1 °C		Linearity Error		0.1°C typ, 0.35°C max	
T	-270 to 350°C	±0.9 °C		•		(-25°C to +105 °C)	
R	0 to 1450°C	±2.3 °C		Temperature Coeff	icient	1 μA/°C typ	
S	0 to 1450°C	±2.3 °C		Long Term Stability		0.1 °C / month	
В	0 to 1700°C	±3.0 °C		Open Thermocoup		On/Off switch-selectable	for
				Open Thermocoup	ie detect	each channel, full-scale rea	
Resolution:	@ 50Hz	@ 60Hz	@ 400Hz			cach channel, full-scale lea	ading
	0.05 °C	0.05 °C	0.40 °C	Darran			
	0.05 °C	0.05 °C	0.40 °C	Power consumption		007 4 1 1441 4	
	0.03 °C	0.04 °C	0.25 °C	+5V Operating	g	887 mA typical, 1441 mA	max
	0.03 °C	0.04 °C	0.25 °C				
	0.06 °C	0.07 °C	0.44 °C	Environmental			
	0.06 °C	0.07 °C	0.52 °C		perature range	0 to 50°C	
	0.00 °C	0.08 °C	0.54 °C	Storage tempe	rature range	−20 to 70°C	
	0.07 C	0.08	0.54 °C	Humidity		0 to 90% non-condensing	
Number of chann	els	16 differential Th	nermocouple				
		inputs, 1 CJC in	put				
A/D pacing		Continuous, prog	grammable for				
		50 Hz, 60 Hz, or	400 Hz;				
		software-triggered					
Data transfer		Single I/O registe					
		through Dual Por					
Conversion Rates	3	50 Hz, 60 Hz, 40					
		software program					
Conversion Rates	(per channel)	22.2 msec,22.3 m					
	(per emainer)	@ 50 Hz sample					
		18.8 msec, 18.9 m					
		@ 60 Hz sample				後間的發行推進。	
		4.6 msec, 4.7 mse			Order	ing Guide	
					or acr	ng Guide	
Linearity error		@ 400 Hz sample					
-		±0.05% @ 4 MH		DOLD IC TO			
Gain drift		±75 ppm/°C max		PCI-DAS-TC		Channel Thermocouple I	
Zero drift	¥	±50uV/°C max			board with So	crew Terminal Adapter, c	able and
Overvoltage Prote	ection	-40 to +55V			DAS Wizard		
CMRR @ 60Hz		80dB min				~ ~ ~ ~ ~ ~ ~ ~ ~	
Input leakage cur	rent	±80 nA max		CIO STA TO		11 1 11 010 17 1	
Input impedance		100Meg Ohms m	in	CIO-STA-TC		al board with CJC and Isoth	ermal bloc
Absolute maximu	m input voltage	-40V to +55V			(one included	with PCI-DAS-TC)	
Isolation to PC		500V min through	h DC/DC				
		converter and opt		C37FFS-05	Five foot, ship	elded cable (one included	with
		mis op			anch PCL DAG		. ** 1 1 1 1 1

DAS-Wizard

Averaging - Moving average, 1 to 16 samples, software-selectable

each channel scan removes offset and

gain error; also CJC each time.

Miscellaneous

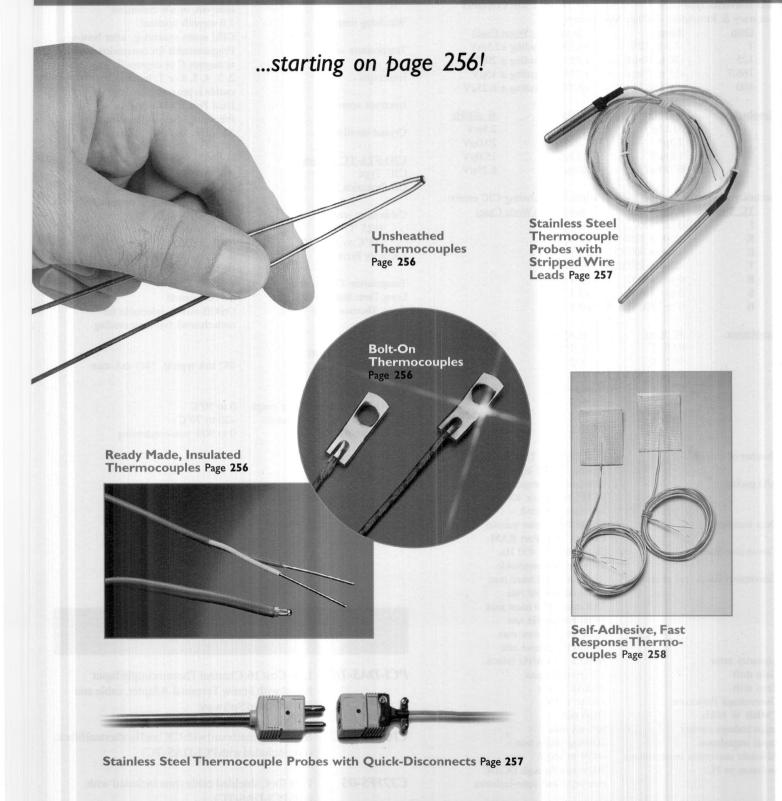
Calibration -

each PCI-DAS-TC)

DAS-Wizard data acquisition for Excel.

(one included with each PCI-DAS-TC)

Don't miss our complete selection of Thermocouples



Thermocouple Wire For our complete selection of thermocouple wire, please see page 258.

PCI-DDA02/16, 04/16, 08/16

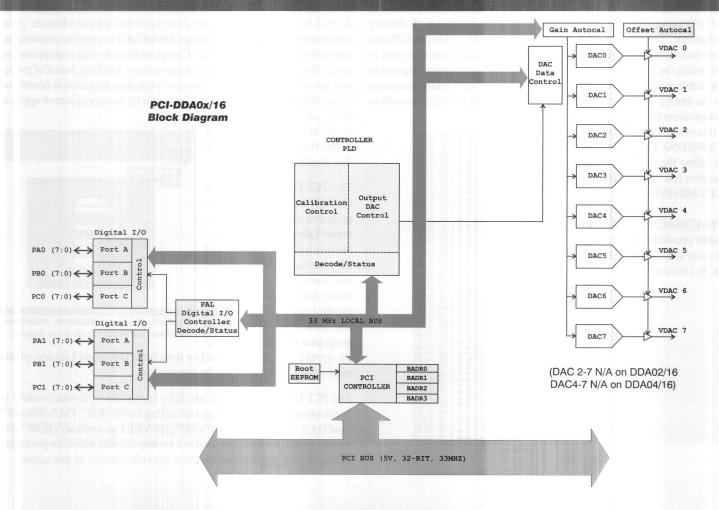
PCI-bus Compatible, 2, 4, & 8-Channel, 16-Bit Analog Output Boards with

48 Digital I/O bits

. & 8 cha D/A pe pit D/A r pits of hig

Features

- 2, 4, & 8 channel analog output models
- One D/A per channel
- 16-bit D/A resolution (1 in 65,536)
- 48 bits of high output digital I/O
- High current digital outputs
- Software selectable output ranges
- Digital I/O section is connector compatible with all ComputerBoards 50-pin based signal conditioning
- Unique *in-system* calibration function allows the removal of wiring IR errors
- Fully Plug-and-Play
- Fully Autocalibrating



Functional Description

The PCI-DDA0x/16 multifunction analog output and digital I/O boards set a new standard for high performance, analog output on the PCI-bus. The PCI-DDA0x/16 family consists of three models with either 2, 4, or 8 output channels and 48 bits of digital I/O. The PCI-DDA0x/16 analog ouput channels may be updated independently or simultaneously.

The PCI-DDA0x/16 is completely plug-and-play. There are no switches, jumpers or potentiometers on the board. All board addresses, interrupt channels etc. are set by your computers plug-and-play software. Even calibration is performed via software by using on-board trim D/A converters. A powerful *in-system* calibration capability allows the board to be calibrated after installation, and eliminates connection wire and connector IR errors. (For more details on our digital calibration techniques, please see our calibration tutorial on page 270).

Analog Outputs

The PCI-DDA0x/16 provides two, four, or eight channels of 16-bit analog output (one part in 65536). Each channel is implemented with an independant D/A converter and the analog outputs are updated under software control. Software selectable output ranges of 0-10V, 0-5V, 0-2.5V, ±10V, ±5V, and ±2.5V are provided and channels may be set at different ranges. The D/A outputs provide rated accuracy to ±5 mA, are

short circuit protected (25 mA limit) and are cleared to 0 volts on power up or reset.

The table below details the input ranges and resolutions for the available input configurations and gains.

Bipolar		Unipolar			
Range	Resolution	Range	Resolution		
±10V	305μV	0-10V	152.6μV		
±5V	152.6μV 0-5V	76.29 µV	7		
±2.5V	76.29µV 0-2.5V	38.15µV	7		

Parallel Digital I/O

The PCI-DDA0x/16 provide 48 bits of parallel, digital I/O in the form of four 8-bit ports and four 4-bit ports. This digital capability is based on an on-board, high output current emulation of the 82C55 mode 0 and allows each of the ports to be set independently as input or output. On power up or reset, the ports default to the input state (high impedance). The digital I/O section of the board is fully connector compatible with all of ComputerBoards 50-Pin digital signal conditioning boards.

I/O Connector & Cables

All I/O signals are brought through a shielded 100-pin high-density connector. The standard C100HD50-X series cable splits the 100 pins into two seperate 50-pin cables. The first 50-pin cable contains pins 1-50, while the second carries pins 51-100 keeping the analog signals in one cable and the digital in another. This configuration minimizes noise in the analog signal lines and greatly simplifies field wiring as well as

connections to external signal conditioning products. The C100HD50-X cable then connects to either the SCB-50 screw connection box (one required) or the CIO-MINI50 (two required).

The C100HDS-X series shielded cable provides greater noise immunity and is compatible with the SCB-100 screw connection box.

Vout 0 Analog Ground Analog Gr	12345678910112134566789101121345667892222222223456789333333333333333333333333333333333333	51235455655785906123555455667777777777777777777777777777777	P2.A7 P2.A6 P2.A3 P2.A3 P2.A3 P2.A3 P2.A7 P2.B7 P2.B7 P2.B7 P2.B8 P2.C6 P2.C7 P2.C7 P2.C7 P1.A7 P1.B8 P1.B9 P1.B9 P1.B9 P1.B1 P1.B1 P1.B1 P1.B1 P1.B3 P1.B2 P1.B3 P1.B2 P1.B3

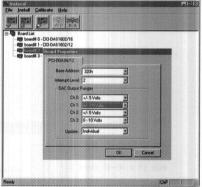
PCI-DDA0x/16 Connector Diagram

Software

All PCI-DDA0x/16 boards come complete with ComputerBoards' powerful *Insta*CalTM software package. *Insta*Cal is a complete installation, calibration and test program for ComputerBoards data acquisition and control boards. Complete with extensive error checking, *Insta*Cal guides you through installation and setup of your data acquisition board and creates the board configuration file for use by your program or applica-

tion software package. *Insta*Cal is described in detail within the software section of this handbook.

The PCI-DDA0x/16 boards are fully supported by ComputerBoards' powerful Universal Library is a complete set of I/O libraries and drivers for all of our boards, in all Windows based languages. When using the Universal Library you can switch boards or even programming languages and



InstaCAL provides installation, calibration and test functions for all of our boards!

the syntax remains constant. For details on Universal Library, please refer to this handbook's software section.

The PCI-DDA0x/16 boards are fully supported by a wide variety of applications software packages including SoftWIRE[™], DAS-Wizard[™], (and DAS-Wizard Pro[™]), HP VEE[®], HP VEE Lab and LabVIEW[™]. For further details on these, as well as a variety of other software packages, please refer to the software section provided earlier in this catalog.

PCI-DDA0x/16 Specifications

Analog Output:

D/A convertor type

Resolution Number of channels Output Ranges Voltage Output 16-bits

8, 4 or 2 depending on model ±10V, ±5V, ±2.5V, 0 - 10V, 0 - 5V, 0 - 2.5V. Each channel independently

programmable.

Data transfer modes

Programmed I/O.

Offset error ± 1.5 LSB (calibrated) Gain error ± 1.5 LSB (calibrated)

Differential nonlinearity
Integral nonlinearity
Monotonicity

±0.5 LSB typ., ±1 LSB max (over temp)
±0.5 LSB typ., ±4 LSB max (over temp)
16-bits

Monotonicity 16-bits
D/A Gain drift ±0.1 ppm/°C
D/A Offset drift ±0.5 ppm/°C

Throughput PC dependent

Settling time 20 μ s max (20V step to ±1.5 LSB) 12 μ s typ (20V step to ±1.5 LSB)

Slew Rate 2.5 V/µs

Current Drive ±5 mA
Output short-circuit duration 25 mA indefinite

Output coupling DC

Output impedance 0.011 Ohms max

In-system calibration range In-system calibration can compensate for

connector/cable resistance up to 7 ohms

Miscellaneous Double buffered output latches

Update DACs individually or simulta-

neously (software selectable) all DAC's cleared to 0 volts

Digital Input / Output

Power up and reset state

Number of channels 48 I/O

Configuration 4 banks of 8, 4 banks of 4,

programmable by bank as input or output

Port configurations Dual 8255 mode 0 emulation

Digital Interface chips Output: 74S244 Input: 74LS373

Output High 2.4 volts @ -15mA min Output Low 0.5 volts @ 64 mA min

Input High 2.0 volts min, 7 volts absolute max
Input Low 0.8 volts max, -0.5 volts absolute min

Power On / Reset State All ports to input mode

Power consumption

PCI-DDA08/16

+5V Operating 1.8A typical, 2.25A max

+12V not used -12V not used PCI-DDA04/16

+5V Operating 1.65A typical, 2.1A max

+12V not used -12V not used

PCI-DDA02/16 +5V Operating 1.6A typical, 2.0A max

+12V not used -12V not used

Environmental

Operating temp range 0 to 70°C Storage temp range -40 to 100°C

Humidity 0 to 90% non-condensing

Auto-Calibration / Self-Calibration

In keeping with general plug-and-play standards, the PCI-DDA0x/16 boards have no switches, jumpers or potentiometers. *Auto-calibration* is performed with trim D/A converters.

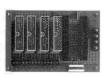
The calibration factors that control the digital trim components are stored in EEPROM on the board. You can remove the board from one computer, install it in another, and it will still provide calibrated data.

For a complete discussion of ComputerBoards unique and powerful auto-calibration and self-calibration techniques, please refer to our Auto- and Self-Calibration tutorial on page 270.

Signal Conditioning & Accessories

Analog Signal Conditioning (require C100HD50-X cable)







ISO-DA02/P*

 $\hbox{2-channel ISO-5B module rack connects an ISO-5B}$

module to each analog output channel.

ISO-DA04/P* 4-channel ISO-5B module rack connects an ISO-5B module to each analog output channel.

ISO-DA08/P* 8-channel ISO-5B module rack connects an ISO-5B

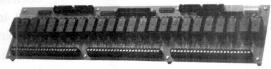
module to each analog output channel.

Solid State I/O Modules & Racks



SSR-RACK48* SSR-RACK24* 48 channel solid state I/O module rack. 24 channel solid state I/O module rack.

Electromechanical Relays





CIO-SERB48*

48 channel relay rack with 10 Amp, socketed and field

replacable Form C relays.

CIO-ERB48* CIO-ERB24* CIO-SERB24* 48 channel relay rack with 6 Amp, Form C relays. 24 channel relay rack with 6 Amp, Form C relays 24 channel fault detecting relay rack with 10 Amp,

socketed and field replacable Form C relays.

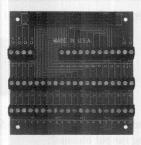
*require C100HD50-X series cable

Screw Terminal Boards

Screw Terminal Accessory Boards and Boxes



SCB-Series Screw Connection Box The 100-pin connector is compatible with the C100HD50-X series cable and the SCB-50 (1 required). The C100HDS-0X series shielded cable provides maximum noise immunity and is compatible with the SCB-100 screw terminal interface box.



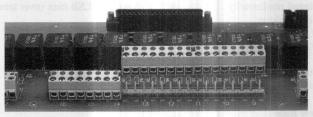
CIO-MINI-50 Screw Terminal Board The 100-pin connector is compatible with the C100HD50-X series cable and the CIO-MINI50 (2 required).

Ordering Guide

PCI-DDA02/16 2-channel, 16-bitD/A & high-current digital I/O board for PCI-bus computers.

PCI-DDA04/16 4-channel, 16-bitD/A & high-current digital I/O board for PCI-bus computers.

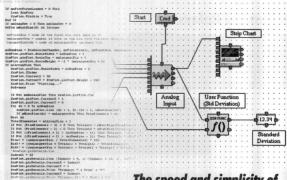
PCI-DDA08/16 8-channel, 16-bitD/A & high-current digital I/O board for PCI-bus computers.



The CIO-MINI50 is available with detachable screw terminals. These terminals simplify field wiring and board replacements. To specify detachable screw terminals order the CIO-MINI50/DST

SoftWIRE™ Graphical Programming for Visual Basic

The power and flexibility of syntactical programming



The speed and simplicity of graphical programming

Introducing SoftWIRE™

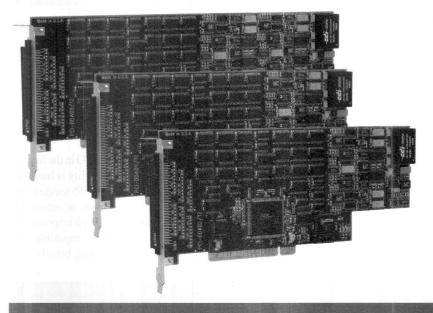
Graphical Programming in Visual Basic®

Syntactical programming has been around since the early days of computers. More recently, graphical programming languages have been introduced and are now a popular alternative to writing hard core, text-based syntax. What's been lacking is an easy way to combine the speed and ease of use of graphical programming with the flexibility and efficiency of writing code in an industry standard language. Until now—Introducing SoftWIRE.

For more information on SoftWIRE, please see pages 6-10 in this catalog.

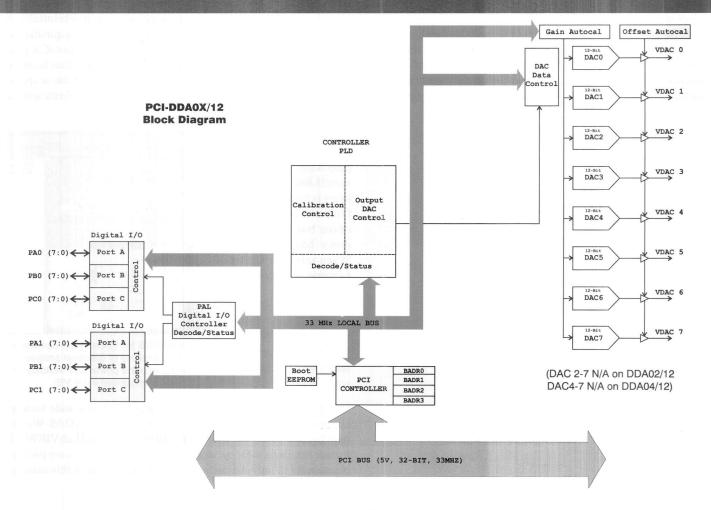
PCI-DDA02/12, 04/12, 08/12

PCI-bus Compatible, 2, 4, & 8-Channel, 12-Bit Analog Output Board with 48 Digital I/O bits



Features

- 2, 4, & 8 channel analog output models
- One D/A per channel
- 12-bit D/A resolution (1 in 4096)
- Software selectable output ranges
- 48 bits of high output digital I/O
- High current digital outputs
- Digital I/O section is connector compatible with all ComputerBoards 50-pin based signal conditioning
- Fully Plug-and-Play
- Fully Autocalibrating



Functional Description

The PCI-DDA0X/12 multifunction analog output and digital I/O boards set a new standard for high performance, analog output on the PCI-bus. The PCI-DDA0X/12 family consists of three models with either 2, 4, or 8, 12-bit output channels and 48 bits of digital I/O. The PCI-DDA0X/12 analog ouput channels may be updated independently or simultaneously.

The PCI-DDA0X/12 is completely plug-and-play. There are no switches, jumpers or potentiometers on the board. All board addresses, interrupt channels etc. are set by your computers plug-and-play software. Even calibration is performed via software by using on-board trim D/A converters. (For more details on our digital calibration techniques, please see our calibration tutorial on page 270).

Analog Outputs

The PCI-DDA0X/12 provides two, four, or eight channels of 12-bit analog output (one part in 4096). Each channel is implemented with an independant D/A converter and the analog outputs are updated under software control. Software selectable output ranges of 0-10V, 0-5V, 0-2.5V, ±10V, ±5V, and ±2.5V are provided and channels may be set at different ranges. The D/A outputs provide rated accuracy to ±5 mA, are

I/O Connector & Cables

All I/O signals are brought through a 100-pin high-density connector. The (optional) C100FF-XX series cable splits the 100 pins into two seperate 50-pin cables. The first 50-pin cable contains the signals from pins 1-50, while the second carries pins 51-100 and keeps the analog signals in one cable and the digital in another. This configuration minimizes noise in the analog signal lines and greatly simplifies field wiring as well as connections to external signal conditioning products.

Vout 0 1
Analog Ground 2
Vout 1 3
Analog Ground 4
Vout 2 5
Analog Ground 6
Vout 3 7
Analog Ground 8
Vout 4 9
Analog Ground 10
Vout 5 1
Analog Ground 10
Vout 6 13
Analog Ground 12
Vout 6 13
Analog Ground 12
Vout 7 15
Analog Ground 14
Vout 7 15
Analog Ground 16
Analog Ground 17
Analog Ground 18
Analog Ground 19
Analog Ground 10
Vout 6 13
Analog Ground 10
Vout 7 15
Analog Ground 10
Analog Ground 1

PCI-DDA0x/12 Connector Diagram

short circuit protected (25 mA limit) and are cleared to 0 volts on power up or reset.

The table below details the input ranges and resolutions for the available input configurations and gains.

Bipolar		Unipolar			
Range	Resolution	Range	Resolution		
±10V	4.88mV	0-10V	2.44mV		
±5V	2.44mV	0-5V	1.22mV		
±2.5V	1.22mV	0-2.5V	0.61mV		

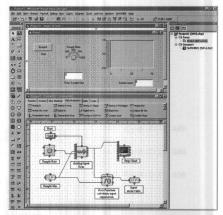
Parallel Digital I/O

The PCI-DDA0X/12 provide 48 bits of parallel, digital I/O in the form of four 8-bit ports and four 4-bit ports. This digital capability is based on an on-board, high output current emulation of the 82C55 mode 0 and allows each of the ports to be set independently as input or output. On power up or reset, the ports default to the input state (high impedance). The digital I/O section of the board is fully connector compatible with all of ComputerBoards 50-Pin digital signal conditioning boards.

Software

All PCI-DDA0X/12 boards come complete with ComputerBoards' powerful *Insta*CalTM software package. *Insta*Cal is a complete installation, calibration and test program for ComputerBoards data acquisition and control boards. Complete with extensive error checking, *Insta*Cal guides you through installation and setup of your data acquisition board and creates the board configuration file for use by your program or application software package. *Insta*Cal is described in detail within the software section of this handbook.

The PCI-DDA0X/12 boards are fully supported by ComputerBoards' powerful Universal Library. Universal Library is a complete set of I/ Olibraries and drivers for all of our boards, in all Windows based languages. When using the Universal Library you can switch boards or even programming languages and the syntax remains constant. For details on Universal Library, please refer to this handbook's software section.



SoftWIRE for Visual Basic combines the simplicity of graphical programming with the power and flexibility of programming in VB!

The PCI-DDA0X/12 boards are fully supported by a wide variety of applications software packages including SoftWIRE[™], DAS-Wizard[™], (and DAS-Wizard Pro[™]), HP VEE[®], HP VEE Lab and LabVIEW[™]. For further details on these, as well as a variety of other software packages, please refer to the software section provided earlier in this catalog.

PCI-DDA0X/12 Specifications

Analog Output:

D/A convertor type

Resolution Number of channels **Output Ranges**

AD7237B 12 bits

8, 4 or 2 depending on model $\pm 10V$, $\pm 5V$, $\pm 2.5V$, 0 - 10V, 0 - 5V, 0 - 2.5V. Each channel independently

programmable.

Data transfer modes

Programmed I/O.

± 600µV (calibrated)

±.02% (calibrated)

Offset error Gain error Differential nonlinearity

±1LSB max Integral nonlinearity ±1LSB max Monotonicity 12 bits D/A Gain drift ±19 ppm/°C D/A Offset drift ±4 ppm/°C

Throughput Settling time PC dependent

10μs max (20V step to ±1/2LSB)

6μs typ (20V step to $\pm \frac{1}{2}$ LSB)

Slew Rate 7V/μs

Current Drive Output short-circuit duration

±5 mA 25 mA indefinite

Output coupling

DC 0.1 Ohms max

Output impedance Miscellaneous

Double buffered output latches

Update DACs individually or simulta-

neously (software selectable) all DAC's cleared to 0 volts

Power up and reset state

Digital Input / Output Number of channels

48 I/O

Configuration

Output High

Output Low

4 banks of 8, 4 banks of 4,

programmable by bank as input or output Port configurations Dual 8255 mode 0 emulation Output: 74S244 Input: 74LS373

Digital Interface chips

2.4 volts @ -15mA min 0.5 volts @ 64 mA min

Input High 2.0 volts min, 7 volts absolute max Input Low 0.8 volts max, -0.5 volts absolute min

Power On / Reset State

All ports to input mode

Power consumption PCI-DDA08/12

+5V Operating +12V -12V PCI-DDA04/12

1.6A typical, 2.6A max 24mA typical, 408mA max 16mA typical, 25mA max

+5V Operating +12V

1.5A typical, 2.4A max 12mA typical, 24mA max 8mA typical, 12mA max

PCI-DDA02/12 +5V Operating +12V

-12V

-12V

1.4A typical, 2.2A max 6mA typical, 12mA max 4mA typical, 6mA max

Environmental

Operating temp range Storage temp range Humidity

0 to 70°C -40 to 100°C

0 to 90% non-condensing

Auto-Calibration / Self-Calibration

In keeping with general plug-and-play standards, the PCI-DDA0X/12 boards have no switches, jumpers or potentiometers. Auto-calibration is performed with trim D/A converters.

The calibration factors that control the digital trim components are stored in EEPROM on the board. You can remove the board from one computer, install it in another, and it will still provide calibrated data.

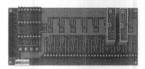
For a complete discussion of ComputerBoards unique and powerful auto-calibration and self-calibration techniques, please refer to our Auto- and Self-Calibration tutorial on page 270.

Signal Conditioning & Accessories

Analog Signal Conditioning







ISO-DA02/P*

2-channel ISO-5B module rack connects an ISO-5B

module to each analog output channel.

ISO-DA04/P*

4-channel ISO-5B module rack connects an ISO-5B

module to each analog output channel.

ISO-DA08/P*

8-channel ISO-5B module rack connects an ISO-5B module to each analog output channel.

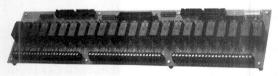
Solid State I/O Modules & Racks

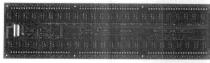


SSR-RACK48* SSR-RACK24*

48 channel solid state I/O module rack. 24 channel solid state I/O module rack.

Electromechanical Relays





CIO-SERB48*

48 channel relay rack with 10 Amp, socketed and

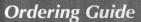
CIO-ERB48* CIO-ERB24* CIO-SERB24* field replacable Form C relays. 48 channel relay rack with 6 Amp, Form C relays. 24 channel relay rack with 6 Amp, Form C relays 24 channel fault detecting relay rack with 10 Amp, socketed and field replacable Form C relays.

Screw Terminal Boards



SCB-50 Screw Connection Box

The PCI-DDA0x/12 series 100-pin connector is compatible with C100FF-XX series cables and may be connected to your filed wiring via the high quality, shielded SCB-50 screw connection box (1 required for all 100 connections)



PCI-DDA02/12

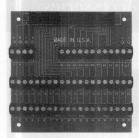
2-channel, 12-bitD/A & high-current digital I/O board for PCI-bus computers.

PCI-DDA04/12

4-channel, 12-bitD/A & high-current digital I/O board for PCI-bus computers.

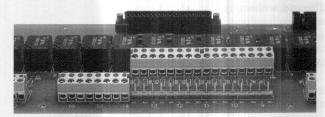
PCI-DDA08/12

8-channel, 12-bitD/A & high-current digital I/O board for PCI-bus computers.



CIO-MINI-50

The PCI-DDA0x/12 series 100-pin connector is compatible with C100FF-XX series cables and may also be connected to your filed wiring via the low cost CIO-MINI50 screw terminal board (2 required).



The CIO-MINI50 is available with detachable screw terminals. These terminals simplify field wiring and board replacements. To specify detachable screw terminals order the CIO-MINI50/DST

DAS-Wizard Data Acquisition Direct to MicroSoft Excel Worksheets

DAS-Wizard

Data acquisition direct to Microsoft Excel worksheets using any ComputerBoards or compatible DAS board for PCI, PC-Card, ISA or PC104.

Automate measurement and control using VBA. Add exciting user interface, graphing and charting integrations with the VIX-Components DAS-Wizard PRO option.

Easy to use single screen interface to I/O and Excel setup.

No data conversion required. Measurements go directly to cells as volts, temperature or A/D counts

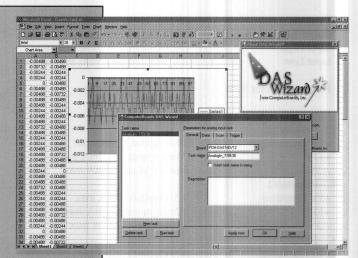
Specifications

Full speed data acquisition Data size limited only by Excel spreadsheet size Excel 97, 95 Windows 95, 98, NT, 2000

Applications

Analog Input/Output
Digital Sensing & Control
Temperature Logging
Laboratory Experiments
Product Test & Verification
Research & Development
Quality Control
Education

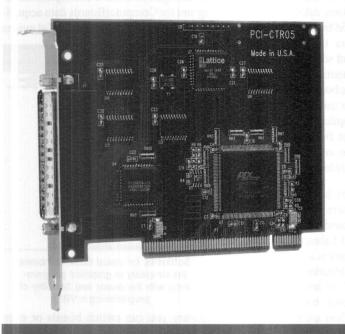
See page 16 for more about DAS-Wizard!



Data Acquisiton, On-Line Manual, Examples, in fact, everything you need to take measurements directly to cells in Microsoft Excel.

PCI-CTR05

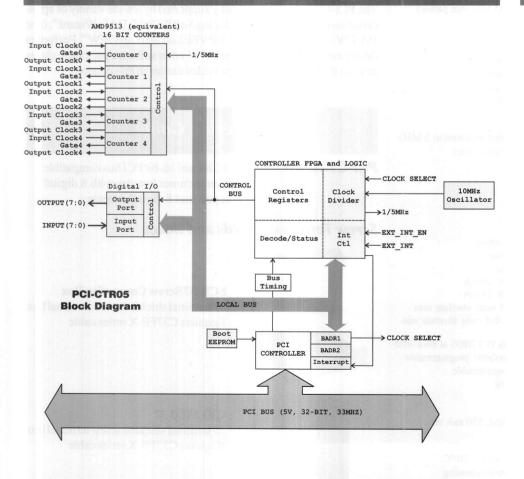
Low Cost, PCI-bus Compatible, 5 Channel, Counter/Timer Board



Features

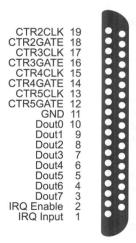
- · Low cost
- 5 Channels, 16-bit counter/timer
- 8 Digital outputs
- 8 Digital inputs
- On-board 10 MHz clock
- Based on powerful 9513 series chip
- Connector compatible with CIO-CTR05
- Register compatible with CIO-CTR05
- Fully plug-and-play

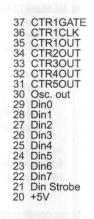
Block Diagram



I/O Connector & Cables

All PCI-CTR05 I/O signals are brought through a 37-pin "D" connector. The (optional) C37FF-XX series cable brings all of the pins out and is suitable for use with all compatible screw terminal and signal conditioning accessory boards. The PCI-CTR05 connector pinout is identical to the standard ISA bus CIO-CTR05 and is fully compatible with the same wide assortment of screw terminal accessory boards.





The PCI-CTR05 is a high performance, low cost 9513 based counter/ timer board for PCI bus compatible computers. Each 9513 provides five counters with 16 bit (65,536 count) count registers. The 9513 is an extremely powerful and flexible and is software programmable for event counting, pulse & frequency measurement, alarm comparator and other input functions. The 9513 can also generate frequencies with complex duty cycles and in one-shot and continuous modes.

The 9513 counters may be chained via software, enabling a 32, 48, 64 or 80 bit counters without requiring hardware connections. In addition the gate source and gating functions are software programmable.

An 8-bit high current digital output port provides logic level control capability and may be used to switch solid state relays. An 8-bit digital input port may be used to sense contact closures. Access to the PCI bus interrupts is also provided.

Specifications

Counter/Timers

Counter type Configuration AM9513 or compatible

Five 16-bit up/down counters per AM9513 All Counters (0-4) provide Gate, Source and Output connections at the 37-pin I/O connector.

Clock input frequency

6.8 Mhz max (145 nsec min period)

High pulse width (clock input) Low pulse width (clock input) 70ns min 70ns min 145 ns min

Gate width
Input low voltage
Input high voltage
Output low voltage

0.5 min, 0.8V max 2.2V min, VCC max 0.4V max @ 3.2 mA 2.4V min @ -200 uA

Output high voltage

Clock source oscillator section

Oscillator type 10MHz crystal divided on-board to 5 MHz

or 1 MHz (software selectable)

Initial tolerance
Temperature coefficient

±0.005% ±50 ppm/°C

Digital Input / Output

Output: 74ACT273 Input: 74LS373

Configuration 1 bank of 8 as output, 1 bank of 8 as input

Number of channels 8 input, 8 output
Output High 2.4 volts min @ -24mA
Output Low 0.5 volts max @ 24 mA

Input High 2.0 volts min, 7 volts absolute max Input Low 0.8 volts max, -0.5 volts absolute min

Interrupts

INTA# - mapped to IRQn via PCI BIOS at boot-time External source - enable & polarity programmable

Interrupt enable Ex Interrupt sources Ex

External source, polarity programmable

1 = active high, 0 = active low

Power consumption

+5V Operating 307 mA typical, 550 mA max

Environmental

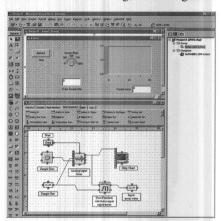
Operating / storage temp 0 to 50 °C / -20 to 70 °C Humidity 0 to 90% non-condensing

Software

The PCI-CTR05 series boards come complete with Computer Boards' powerful *Insta*Cal[™] software package. *Insta*Cal is a complete installation, calibration and test program for Computer Boards data acquisition boards. Complete with extensive error checking, *Insta*Cal guides

you through installation and setup of your data acquisition board and creates the board configuration file for use by your program or application software package. *Insta*Cal is described in the software section of this catalog.

The boards are fully supported by Computer-Boards' powerful Universal Library. Universal Library is a complete set of I/Olibraries and drivers for all of our boards, for all Windows based languages.



SoftWIRE for Visual Basic combines the simplicity of graphical programming with the power and flexibility of programming in VB!

When using the Universal Library you can switch boards or even programming languages and the syntax remains constant. Universal Libraryis fully described in the software section of this handbook.

The PCI-CTR05 boards are fully supported by a wide variety of applications software packages including SoftWIRE $^{\text{TM}}$, DAS-Wizard $^{\text{TM}}$, (and DAS-Wizard Pro $^{\text{TM}}$), HP VEE $^{\text{SM}}$, HP VEELab and LabVIEW $^{\text{TM}}$. For further details on these, as well as a variety of other software packages, please refer to the software section provided earlier in this catalog.

Ordering Guide

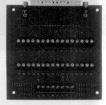
PCI-CTR05

5 Channel 16-bit PCI bus compatible counter/timer boardm with 8 digital inputs and 8 digital outputs

Screw Terminal Boards and Boxes



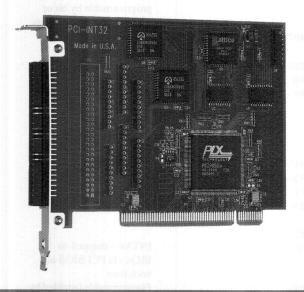
SCB-37 Screw Connection Box 37 terminal shielded screw terminal box. Requires C37FF-X series cable



CIO-MINI-37
37 terminal shielded screw terminal box.
Requires C37FF-X series cable

PCI-INT32

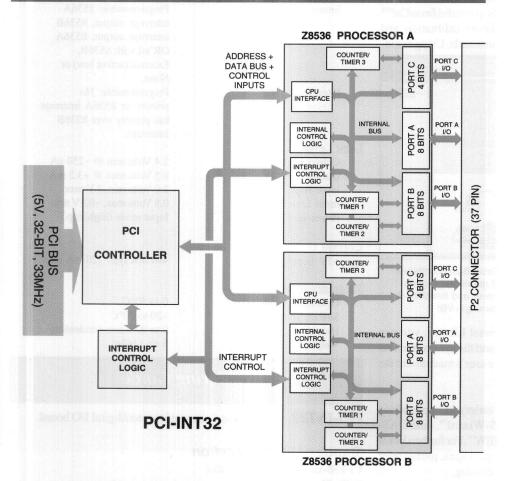
32 Vector Interrupt Director. Provides up to 40 lines of digital I/O and six 16-bit counter/timers. Two powerful Zilog Z8536 packages have a wide range of functions.



Features

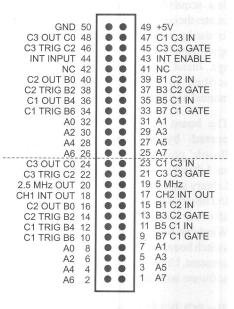
- Two Zilog Z8536 programmable CIOs give powerful interrupt management capabilities.
- Each CIO can do three modes of pattern-recognition interrupts.
- Three ports of 40 digital I/O lines can be implemented.
- Two ports (A & B) can do three modes of I/O handshake.
- Each CIO has three independent 16-bit counter/timers.
- Register compatible with CIO-INT32
- Connector compatible with CIO-INT32
- Counter/Timer 1 out can be linked in three ways to Counter 2.
- Interrupt priority resolution is either by a separate on-board programmable controller or by daisy chain position.
- Board has positions for pull-up/pull-down resistors.

Block Diagram



I/O Connector & Cables

All I/O signals are brought through a 50-pin connector. The (optional) C50FF-XX series cable brings all of the pins out and is suitable for use with all the SCB-50 screw connection box as well as the CIO-MINI50 screw terminal board.



The PCI-INT32 is a powerful counter time and digital I/O board for PCI bus computers. The board is based on two Zilog Z8536s as well as a variety of other logic elements can be configured to perform a huge number of timing, triggering, counting and parallel I/O functions.

A Z8536 has five potential sources of interrupts: three counter/timers (C/Ts) and ports A and B. The priorities are fixed as follows: C/T3, port A, C/T2, port B, C/T1 (highest to lowest). The Z8536s are programmable to generate interrupts based on an external bit change, recognizing a specific bit-pattern, or a counter/timer reaching a terminal count. See the Z8536 manual for additional options.

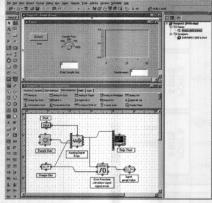
The three ports are function-specific. Ports A and B are general-purpose while port C is a 4-bit special-purpose port. However, all three ports can be programmed as I/O bit ports, but only A and B can function as handshake ports (port C provides control in this case). Ports A and B are also used for pattern recognition, and port B is for external control of counter/timers 1 and 2. Interrupt priority resolution can be done either by using internal interrupt logic in a Z8536 or by using a separate on-board interrupt controller. Both schemes can be used in the same CPU environment.

Software

All PCI-INT32 boards come with ComputerBoards' powerful *Insta* CalTM software package. *Insta* Cal is a complete installation, calibration, and test program for ComputerBoards data acquisition boards. Using exten-

sive error checking, *Insta*-Cal guides you through installation and setup of your data acquisition board. It creates the configuration file for use by your program or application software package. *Insta*Cal is fully described in a dedicated manual and our catalog.

The board is fully supported by Computer-Boards' powerful Universal Library. The Universal Library is a complete set of I/O libraries and drivers for all of our boards and for all



SoftWIRE for Visual Basic combines the simplicity of graphical programming with the power and flexibility of programming in VB!

Windows-based languages. When using Universal Library, you can switch boards or even programming languages and the syntax remains constant. Universal Library is fully described in a user's manual and the software section of our catalog.

The PCI-INT32 is fully supported by a wide variety of applications software packages including SoftWIRE[™], DAS-Wizard[™], (and DAS-Wizard Pro[™]), HP VEE®, HP VEE Lab and LabVIEW[™]. For further details on these, as well as a variety of other software packages, please refer to the software section provided earlier in this catalog.

Performance Specifications

Configured as Digital Input/Output Ports:

Digital Configuration Four banks of 8, Ports A, B Two banks of 4 (Port C),

programmable by bit or bank as inputs or outputs

Number of channels

Configured as Counters: (Ports B and C only)

Counter type Zilog Z8536

Counter Configuration Six 16-bit counter/timers
All Trigs, Sources, Gates,
and Outputs available at

user connector.

Clock input frequency

High pulse width (clk input)
Low pulse width (clock input)
Trigger pulse width (high,low

3 MHz max 150 ns min 150 ns min 130ns

Interrupts:

Interrupts INTA# - mapped to

IRQn via PCI BIOS at

boot-time

Interrupt enable Programmable (enabled by

default) and External Enable, active low (pulled high through resistor).

Interrupt source select Programmable: 8536A

interrupt output, 8536B interrupt output, 8536A OR'ed with 8536B, External (active low) or

None.

Interrupt priority Programmable: No priority or 8536A interrupt

has priority over 8536B

interrupt.

Logic Levels

Output High Output Low Input High Input Low Power-up / reset state 2.4 Volts min @ -250 uA 0.5 Volts max @ +3.2 mA 2.0 Volts min, 7 V max 0.8 Volts max, -0.3 V min Input mode (high imp.)

Current consumption

+5V Supply

440 mA typ / 720 mA max.

Environmental/physical

Operating Temperature Storage Temperature 0 to 50°C -20 to 70°C

Humidity 0 to 90% non-condensing

Weight 5 oz (142g)

Ordering Guide

PCI-INT32

Low-cost, interrupt/counter/digital I/O board.

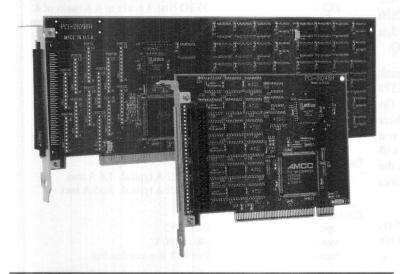
Standard I/O Connection

CFF50-xx 50-pin cable

SCB-50 50 terminal screw connection box CIO-MINI50 50 terminal screw terminal board

PCI-DIO96H & PCI-DIO48H

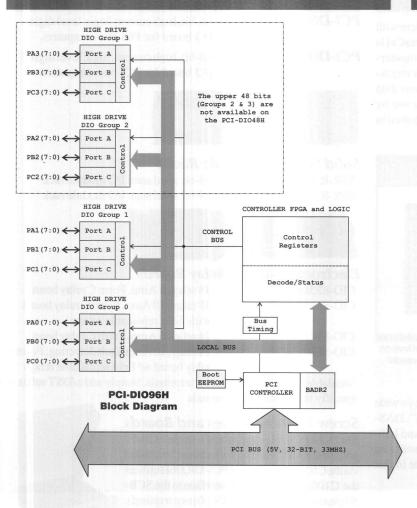
PCI-bus Compatible, 96-Bit and 48-Bit, High Output Current, Logic Level Digital I/O Boards



Features

- 48 or 96 digital I/O bits
- High drive output (64 mA sink, 15 mA source)
- Emulates 8255 mode 0
- Compatible with a wide variety of relay and SSR module racks
- Software compatible with CIO-DIO48H/96H
- Fully plug-and-play

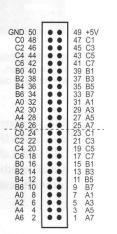
Block Diagram



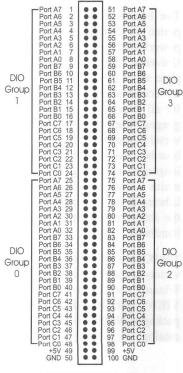
I/O Connector & Cables

All PCI-DIO96H I/O signals are brought through a 100-pin high-density connector. The C100FF-XX series cable splits the 100 pins into two seperate 50-pin cables. The first 50-pin cable contains the signals from pins 1-50, (groups 0 & 1), while the second carries pins 51-100, (groups 2 & 3). These 50-pin cables are fully compatible with the SCB-50 and CIO-MINI50 screw terminal boxes/boards as well as all ComputerBoards 50-pin relay and solid state I/O module racks. The

PCI-DIO48H signals are brought out through a 50-pin connector. The C50FF-XX cable connects the board to the SCB-50, CIO-MINI50 or any of our 50-pin compatible digital signal conditioning boards.



PCI-DIO48H Connector Diagram



PCI-DIO96H Connector Diagram

board to allow users to quickly and easily install SIP resistor networks in either pull-up or pull-down configurations.

The PCI-DIO48H and PCI-DIO96H are completely plug-and-play. There are no switches or jumpers on the board. All board addresses are set by your computer's plug-and-play software.

Software

All PCI-DIO96H and PCI-DIO48H series boards come complete with ComputerBoards's powerful *Insta*Cal[™] software package. *Insta*Cal is a complete installation, calibration and test program for ComputerBoards data acquisition boards. Complete with extensive error checking, *Insta*Cal guides you through installation and setup of your data acquisition board and creates the board configuration file for use by your program or application software package. *Insta*Cal is described in the software section of this handbook.

The boards are fully supported by ComputerBoards' powerful Universal Library. Universal Library is a complete set of I/O libraries and drivers for all of our boards, for all Windows based languages. When using the Universal Library you can switch boards or even programming languages and the syntax remains constant. Universal Library is fully described in the software section of this handbook.



InstaCAL provides installation, calibration and test functions for all of our boards!

The PCI-DIO96H and PCI-DIO48H boards are fully supported by a wide variety of applications software packages including SoftWIRE[™], DAS-Wizard[™], (and DAS-Wizard Pro[™]), HP VEE[®], HP VEE Lab and Lab-VIEW[™]. For further details on these, as well as a variety of other software packages, please refer to the software section provided earlier in this catalog.

PCI-DIO48H PCI-DIO96H +5V: 1.2 A typical, 1.6 A max +5V: 2.2 A typical, 3.35 A max

Environmental

Operating temperature Storage temperature

Humidity

0 to 70°C -40 to 100°C

0 to 90% non-condensing

Ordering Guide

PCI-DIO96H

96-bit, high current, logic level digital I/O board for PCI bus computers.

PCI-DIO48H

48-bit, high current, logic level digital I/O board for PCI bus computers.



Solid State I/O Module Racks

SSR-RACK48* 48-bit solid state I/O module rack SSR-RACK24* 24-bit solid state I/O module rack



Electromechanical Relay Boards

CIO-ERB48* CIO-SERB48* 48 relay, 6 Amp, Form C relay board 48 relay, 10 Amp, Form C relay board

with field replacable relays

CIO-ERB24* CIO-SERB24* 24 relay, 6 Amp, Form C relay board 24 relay, 10 Amp, fault detecting, Form C relay board w/ field replacable relays

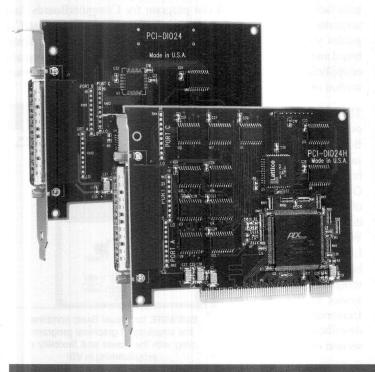
*available with detachable screw terminals. Simply add a /DST suffix to specify the detachable terminals

Screw Terminal Boxes and Boards

The PCI-DIO48H is compatible with the SCB-50 and the CIO-MINI50 screw terminal box/board via the C50FF-2 cable. The PCI-DIO96H utilizes the C100FF-2 cable as an interface to the SCB-50 (one required) or CIO-MINI50 (two required).

PCI-DIO24H & PCI-DIO24

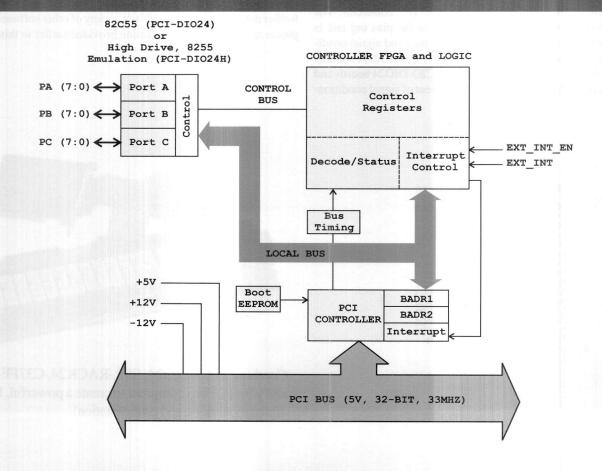
24-Bit PCI-bus Compatible, Logic Level Digital I/O Boards



Features

- 24 digital I/O bits
- Extremely low cost
- PCI-DIO24 provides direct connections to an 82C55
- PCI-DIO24H provides high current 82C55 mode 0 emulation (64 mA sink, 15 mA source)
- Compatible with a wide variety of Relay and SSR module racks
- Software compatible with the CIO-DIO24H and CIO-DIO24
- Connector compatible with the popular CIO-DIO24H and CIO-DIO24

Block Diagram



The PCI-DIO24 and PCI-DIO24H are low cost, 24-bit, logic level digital I/O boards for PCI bus compatible computers. The PCI-DIO24 is based on the industry standard 82C55 chip, and the 82C55 I/O pins are brought directly to the board's I/O connector. The 82C55 is a powerful 24 bit chip and functions as two 8-bit ports, (Ports A and B) and a third 8-bit port (Port C) that may be further divided into two 4-bit ports (Port C-HI and C-LO). The CMOS outputs of the 82C55 are suitable for driving a wide array of logic devices, though the chips ±2.5 mA drive capability may not be enough in some applications.

The PCI-DIO24H board provides a discrete logic emulation of the 82C55 mode 0, but offers significantly higher output drive capability (64 mA sink, 15 mA source). This mode 0 emulation is fully compatible with the 82C55, and code written for 82C55 mode based boards will function perfectly on the PCI-DIO24H.

The PCI-DIO24(H) boards are connector and software compatible with ComputerBoards highly popular ISA based CIO-DIO24 board as well as a host of other 8255 based boards from other vendors. The boards are also supported by the same wide variety of external relay and solid state I/O module racks as the CIO-DIO24 boards.

The PCI-DIO24 is completely plug-and-play. There are no switches, or jumpers on the board. All board addresses, interrupt channels etc. are set by your computers plug-and-play software.

I/O Connector & Cables

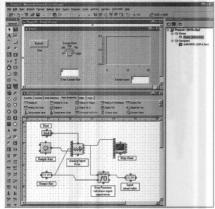
All I/O signals are brought through a 37-pin "D" connector. The (optional) C37FF-XX series cable brings all of the pins out and is suitable for use with all compatible screw terminal and signal conditioning accessory boards. The PCI-DIO24 and PCI-DIO24H connector pinout is identical to the standard ISA bus CIO-DIO24 boards and is fully compatible with the same wide assortment of signal conditioning accessory boards.

Port A0 Port A1 +5V GND 36 Port A2 Port A3 33 32 Port A4 14 13 12 Port A5 GND Port A6 No Connect Port A7 GND Port C0 29 PortB0 PortB1 10 28 Port C1 Port C2 PortB2 26 25 Port C3 PortB3 Port C4 24 23 22 21 PortB4 654 Port C5 PortB5 Port C6 Port C7 PortB6 PortB7 GND IRQ Enable IRQ Input

Software

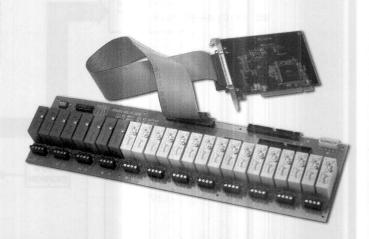
All PCI-DIO24 and PCI-DIO24H boards come complete with Computer-Boards' powerful *Insta* Cal[™] software package. *Insta* Cal is a complete installation, calibration and test program for ComputerBoards data acquisition boards. Complete with extensive error checking, *Insta* Cal guides you through installation and setup of your data acquisition board and creates the board configuration file for use by your program or application software package. *Insta* Cal is described in the software section of this handbook.

The boards are fully supported by Computer-Boards' powerful UniversalLibrary. Universal Library is a complete set of I/ Olibraries and drivers for all of our boards, for all Windows based languages. When using the Universal Library you can switch boards or even programming languages and the syntax remains constant. Universal Library is fully described in the software section of this handbook.



SoftWIRE for Visual Basic combines the simplicity of graphical programming with the power and flexibility of programming in VB!

The PCI-DIO24 boards are also fully supported by a wide variety of applications software packages including SoftWIRE $^{\text{\tiny{TM}}}$, DAS-Wizard $^{\text{\tiny{TM}}}$, (and DAS-Wizard Pro $^{\text{\tiny{TM}}}$), HP VEE $^{\text{\tiny{SM}}}$, HP VEE Lab and Lab VIEW $^{\text{\tiny{TM}}}$. For further details on these, as well as a variety of other software packages, please refer to the software section provided earlier in this catalog.



Combine a PCI-DIO24, SSR-RACK24, C37FF-2 cable and your PCI bus computer to create a powerful, low cost digital monitoring and control station!

PCI-DIO24 (&24H) Specifications

PCI-DIO24

Digital Input / Output

Configuration 2 banks of 8, 2 banks of 4, programmable by

bank as input or output

I/O device type 82C55 Number of channels 24 I/O

Output High 3.7 volts min @ -2.5mA Output Low 0.4 volts max @ 2.5mA

2.2 volts min, VCC + .3 volts absolute max Input High Input Low 0.8 volts max, -0.3 volts absolute min

Power-up / reset state Input mode (high impedance)

Interrupts INTA# - mapped to IRQn via PCI BIOS at

boot-time External (IR ENABLE, active low, Interrupt enable

programmable through PCI9050-1; 0 = disabled, 1 = enabled (default)

External source (IR INPUT), polarity programmable through PCI9050-1; 1 = active high, 0 = active low (default)

Power consumption

Interrupt sources

+5V Operating 240 typical, 350 max

+12, -12not used, but supplied to I/O connector

Environmental

0 to 50 °C Operating temperature Storage temperature -20 to 70 °C

0 to 90% non-condensing Humidity

PCI-DIO24H

Digital Input / Output

Configuration 2 banks of 8, 2 banks of 4, programmable by

bank as input or output

I/O Device Type TTL based 8255 mode 0 emulation Output: 74S244

Input: 74LS373

Number of channels 24 I/O

Output High 2.4 volts min @ -15mA Output Low 0.5 volts max @ 64 mA

Input High 2.0 volts min, 7 volts absolute max Input Low 0.8 volts max, -0.5 volts absolute min

Power-up / reset state Input mode (high impedance)

Interrupts INTA# - mapped to IRQn via PCI BIOS at

boot-time

External (IR ENABLE, active low, programmable through PCI9050-1;

0 = disabled, 1 = enabled (default)Interrupt sources External source (IR INPUT), polarity programmable through PCI9050-1:

1 = active high, 0 = active low (default)

Power consumption

Interrupt enable

+5V Operating 625 mA typical, 960 mA max +12, -12 not used, but supplied to I/O connector

Environmental

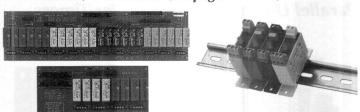
Operating temperature 0 to 50°C Storage temperature

Humidity

-20 to 70°C 0 to 90% non-condensing

Signal Conditioning & Accessories

Solid State I/O Modules (see pages 176-178)



SSR-RACK08* SSR-RACK24*

DR-Series

8 channel solid state I/O module rack. 24 channel solid state I/O module rack. Single point, DIN rail mountable Solid State

I/O modules.

Electromechanical Relays (see pages 174-175)





CIO-ERB08* CIO-SERB08* 8 channel relay rack with 6 Amp, Form C relays 8 channel relay rack with 10 Amp, socketed and

field replacable Form C relays.

CIO-ERB24* CIO-SERB24* 24 channel relay rack with 6 Amp, Form C relays 24 channel relay rack with 10 Amp, socketed and

field replacable Form C relays.

Screw Terminal Accessory Boards & Cables



SCB-37 Screw Connection Box 37 terminal shielded screw terminal box. Requires C37FF-X series cable



CIO-MINI-37

37 terminal shielded screw terminal box. Requires C37FF-X series cable.

* Items denoted with an asterisk are available with detachable screw terminals. These terminals simplify field wiring and board replacements. To specify detachable screw terminals add a /DST suffix to the part number (e.g. CIO-MINI37/DST or CIO-ERB24/DST).

Ordering Guide

PCI-DIO24

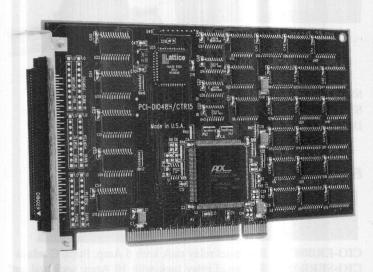
24-bit, low cost, logic level digital I/O board for PCI-bus computers.

PCI-DIO24H

24-bit, high current, logic level digital I/O board for PCI-bus computers.

PCI-DIO48H/CTR15

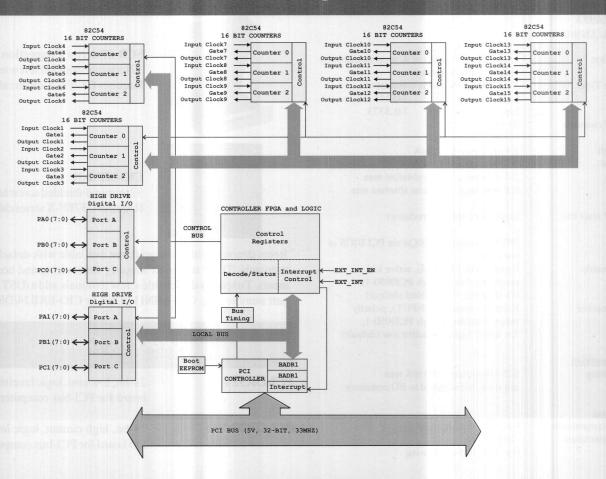
Multifunction, PCI-bus Compatible, Digital I/O Board with Both Parallel Digital I/O and Counter/Timers



Features

- 48 high current digital I/O bits
- Fifteen 16-bit counters
- Compatible with a wide variety of Relay and SSR module racks
- Fully Plug-and-Play
- · Low cost
- High density
- On-board provisions for user installed pull-up and pull-down resistor networks
- Power on in input (High Z) mode

Block Diagram



PCI-DIO48H/CTR15 Functional Description

The PCI-DIO48H/CTR15 is a multifunction, logic level, digital I/O board for PCI bus compatible computers. The board offers a powerful combination of parallel digital and counter/timer functionality.

The PCI-DIO48H/CTR15 provides 48-bits of high current, parallel digital I/O and fifteen 16-bit counters.

The parallel digital I/O is provided in 24-bit *groups* based on an 82C55, mode 0 emulation. Each group provides an 8-bit port A and port B, and an 8-bit port C that can be split into independant 4-bit ports C-HI and C-LO. The 74S244 digital output drivers provide 64 mA sink and 15 mA source current capabilities. The 74LS373 input buffers offer the high standard input impedance of the 74LS series. On power up and reset, all I/O bits are set to input mode. Like all members of the 74LS series, unconnected inputs will typically float high. If you are using the board to control items that must be *OFF* on reset, you will need to install pull down resistors. Provisions have been made on the board to allow users

to quickly and easily install SIP resistor networks in either pull-up or pull-down configurations.

The parallel digital I/O of the PCI-DIO48H/CTR15 are pin for pincompatible with our popular CIO-DIO48 series boards.

The counter/timer functionality of the board is based on the 82C54, which provides three 16-bit down counters. The counter section provides access to the gate, clock and counter output of all three of the 82C54 counters. The PCI-DIO48H/CTR15 provides 15 counters (three 82C54s). The board also provides a high-stability, 10-MHz crystal controlled oscillator that may be connected to one or more of the counter inputs.

The board is completely plug-and-play and there are no switches or jumpers that you must set. All board addresses, interrupt levels, etc. are set by your computer's plug-and-play software.

I/O Connector & Cables

All I/O signals of the PCI-DIO48H/CTR15 are brought out through a 100-pin connector. The C100FF-XX cable splits the 100 pin connector into two 50-pin cables that are compatible with the SCB-50 screw connection box (requires one), the CIO-MINI50 (requires two) as well as a large variety of our 50-pin compatible digital signal conditioning boards.

PCI-DIO48H/CTR15

Port B5 B Port B4 B B Port B4 B B B Port B4 B B B Port B1 B B Port B6 B B Port C7 B B B Port C7 B B D Port C3 B B D Port C3 B B D Port C3 B B D Port C4 B B D Port C4 B B D Port C4 B D Port C5 B D Port C5 B D Port C6 B D D Port C6 B D D Port C7 B D D D D D D D D D D D D D D D D D D	2	51 52 53 54 55 56 57 58 60 61 62 63 64 65 66 67 77 77 77 77 77 77 77 77 77 77 77	CTR1CLK CTR1GATE CTR1GATE CTR2CLK CTR2CLK CTR2CUT CTR3CLK CTR3GATE CTR3OUT CTR4CLK CTR4GATE CTR4OUT CTR5CLK CTR5GATE CTR5OUT CTR5CLK CTR5GATE CTR6OUT CTR6CLK CTR6GATE CTR7CLK CTR7GATE CTR7CLK CTR7GATE CTR7OUT CTR7CLK CTR7GATE CTR7OUT CTR7CLK CTR7GATE CTR7OUT CTR7CLK CTR1GATE CTR10CLK CTR1GATE CTR11CLK CTR11GATE CTR11CLK CTR11

PCI-DIO48H/CTR15 Connector Diagram

Software

All PCI-DIO48H/CTR15 series boards come complete with Computer-Boards' powerful *Insta* CalTM software package. *Insta* Cal is a complete installation, calibration and test program for ComputerBoards data acquisition boards. Complete with extensive error checking, *Insta*Cal guides you through installation and setup of your data acquisition board and creates the board configuration file for use by your program or application software package. *Insta*Cal is described in the software section of this catalog.

The boards are fully supported by Computer-Boards' powerful Universal Library is a complete set of I/O libraries and drivers for all of our boards, for all Windows based languages. When using the Universal Library you can switch boards or even programming languages and the syn-



Universal Library provides powerful, easy to use functions with extensive sample programs and greatly reduces your programming effort.

tax remains constant. Universal Library is fully described in the software section of this handbook.

The PCI-DIO48H/CTR15 boards are fully supported by a wide variety of applications software packages including SoftWIRE™, DAS-Wizard™, (and DAS-Wizard Pro™), HP VEE®, HP VEE Lab and LabVIEW™. For further details on these, as well as a variety of other software packages, please refer to the software section provided earlier in this catalog.

Specifications

Digital Input / Output

Number of channels

Configuration Groups of 24: 2 banks of 8, 2 banks of 4,

programmable by bank as input or output

I/O Device Type TTL based 8255 mode 0 emulation

Output: 74S244 Input: 74LS373

Output High 2.4 volts min @ -15mA Output Low 0.5 volts max @ 64 mA

Input High 2.0 volts min, 7 volts absolute max
Input Low 0.8 volts max, -0.5 volts absolute min

Power-up / reset state Input mode (high impedance)

Interrupts INTA# - mapped to IRQn via PCI BIOS at

boot-time

Interrupt enable External (IR ENABLE, active low,

programmable through PCI9050-1; 0 = disabled, 1 = enabled (default)

Interrupt sources External source (IR INPUT), polarity programmable through PCI9050-1;

1 = active high, 0 = active low (default)

Counter section

Configuration 82C54 w/three 16-bit down counters/82C54

PCI-DIO48H/CTR15 provides five 82C54s

82C54 pinouts:

Counter 0

Source: Available at connector
Gate: Available at connector
Output: Available at connector

Counter 1 -

Source: Available at connector
Gate: Available at connector
Output: Available at connector

Counter 2 -

Source: Available at connector
Gate: Available at connector
Output: Available at connector

Clock input frequency 10 Mhz max High pulse width (clk input) 30 ns min Low pulse width (clk input) 50 ns min Gate width high or low 50 ns min Input low voltage 0.8 V max Input high voltage 2.0 V min Output low voltage 0.4 V max Output high voltage 3.0 V min

Clock source oscillator section

Oscillator type 10 MHz crystal Initial tolerance $\pm 0.005\%$ Temperature coefficient $\pm 50 \text{ ppm/}^{\circ}\text{C}$

Power consumption

+5 V 1395 mA typical, 1760 mA max

Environmental

Operating temperature 0 to 50°C Storage temperature -20 to 70°C

Humidity 0 to 90% non-condensing

Signal Conditioning & Accessories

Solid State I/O Modules





SSR-RACK24* SSR-RACK48* 24 channel solid state I/O module rack.
48 channel solid state I/O module rack.

Electromechanical Relays





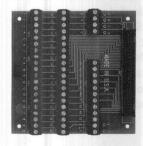
CIO-ERB24* CIO-SERB24* 24 channel relay rack with 6 Amp, Form C relays 24 channel relay rack with 10 Amp, socketed and

field replacable Form C relays.

CIO-ERB48* CIO-SERB48* 48 channel relay rack with 6 Amp, Form C relays 48 channel relay rack with 10 Amp, socketed and field replacable Form C relays.

Screw Terminal Accessory Boards & Cables





SCB-50

50-Pin compatible screw terminal box (one required to interface to all 100 pins)

CIO-MINI50*

50-pin, screw terminal board (two required to con-

nect to all 100 pins)

C100FF-XX

100-pin to dual 50 pin cable

* Items denoted with an asterisk are available with detachable screw terminals. These terminals simplify field wiring and board replacements. To specify detachable screw terminals add a /DST suffix to the part number (e.g. CIO-MINI37/DST or CIO-ERB24/DST).

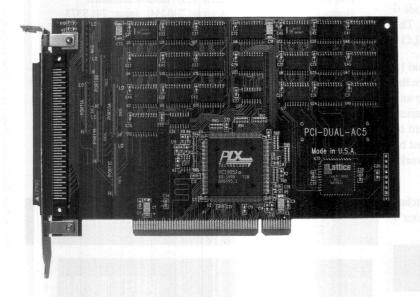
Ordering Guide

PCI-DIO48H/CTR15

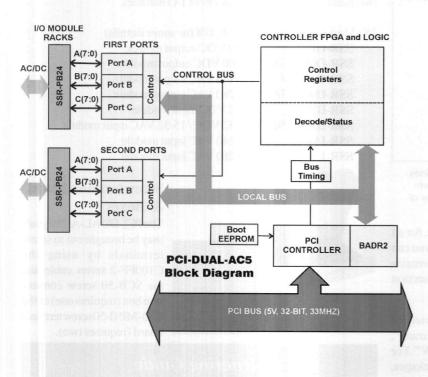
48-bit digital I/O, 15 counter/timer board for PCI-bus computers.

PCI-DUAL-AC5

PCI-bus Compatible, 48-Bit, High Output Current, Logic-Level Digital I/O Board. Designed For SSR-PB24 Solid-State Relay Racks



Block Diagram



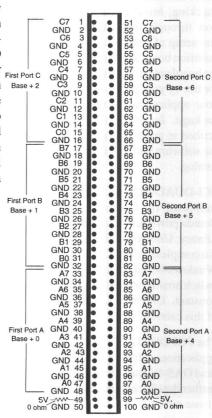
Features

- 48 digital I/O bits
- Directly control two SSR-PB-24 SS Relay Racks
- High drive output (64 mA sink, 15 mA source)
- Emulates 8255 mode 0
- Fully plug-and-pla
- Shipped with InstaCal™ install and test software
- Register & connector compatible with CIO-DUAL-AC5

I/O Connector & Cables

All PCI-DUAL-AC5 I/O signals pass through a 100-pin high-density connector. For edge connector PB24, use the C100FE-#series that cable splits the 100 pins into two seperate 50-pin cables. The first 50-pin cable contains the signals from pins 1-50, (First Ports, A, B, and C), while the second 50-pin cable carries pins 51-100, (Second Ports A, B, and C). These 50-pin

cables are directly compatible with standard PB24 series solid state I/O module racks. For header connection base + 2 versions of the PB24 as well as to interface the board to 50 or 100-pin screw terminal boards using a C100FF#cable.



The PCI-DUAL-AC5 is a high density, logic level, digital I/O board for PCI bus-compatible computers. The PCI-DUAL-AC5 has been designed specifically to interface with two, standard, PB-24 solid state I/O module racks. offers 48 bits of digital I/O. The board's I/O is organized into two 24-bit Ports, ("first" and "second") based on 82C55, mode 0 emulation. Each 24-bit port provides three 8-bit ports A, B, and C. The C ports can be split into two 4-bit ports, C-HI and a 4-bit port C-LO.

The digital output drivers, 74S244 chips, provide 64 mA sinking and 15 mA sourcing capability. The input buffers are 74LS373 and have the high input impedance standard of the 74LS series. On power up and reset, all I/O bits are set to input mode. Like all members of the 74LS series, unconnected inputs will typically float high. If using the board to control items that must be OFF on reset, pull-down resistors must be installed. The board has provisions for installing SIP resistor networks (one SIP per 8-bits) for either pull-up or pull-down.

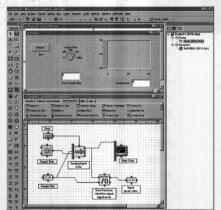
The PCI-DUAL-AC5 is completely plug-and-play. There are no switches or jumpers on the board. All board addresses are set by your computer's plug-and-play software.

Software

The PCI-DUAL-AC-5 board is shipped with ComputerBoards' powerful *Insta*CalTM software package. *Insta*Cal is a complete installation, calibration and test program for ComputerBoards data

acquisition boards. Complete with extensive error checking, *Insta*Cal guides you through installation and setup of your data acquisition board and creates the board configuration file for use by your program or your application software package. *Insta*Cal is described in greater detail in the software section of this catalog.

PCI-DUAL-AC5 is fully supported by Computer-Boards'powerful Universal Library. Universal Library



SoftWIRE for Visual Basic combines the simplicity of graphical programming with the power and flexibility of programming in VB!

is a complete set of I/O libraries and drivers for all of our boards, for all Windows-based languages. When using the Universal Library you can switch boards or even programming languages and the syntax remains constant. Universal Library is fully described in the software section of this catalog.

The PCI-DUAL-AC-5 board is fully supported by a wide variety of applications software packages including SoftWIRE $^{\text{\tiny{TM}}}$, DAS-Wizard $^{\text{\tiny{TM}}}$, (and DAS-Wizard Pro $^{\text{\tiny{TM}}}$), HP VEE $^{\text{\tiny{B}}}$, HP VEE Lab and LabVIEW $^{\text{\tiny{TM}}}$. For further details on these, as well as a variety of other software packages, please refer to the software section provided earlier in this catalog.

Specifications

Digital Input / Output Configuration:

Port configurations
Digital Interface chips
Output High
Output Low
Input High
Input Low
Power On / Reset State

Power consumption +5V Operating:

Environmental

Operating temperature Storage temperature Humidity 48 I/O bits: 4 ports of 8 each, plus 4 ports of 4 each, programmable by bank as input or output
Dual 8255, mode 0 emulation
Output: 74S244; Input: 74LS373
2.4 Volts @ 15mA min. (source)
0.5 Volts @ 64 mA min. (sink)
2.0 Volts min, 7 Volts absolute max
0.8 Volts max, -0.5 Volts absolute min
All ports to input mode (high impedance)

1.129 A typical, 1.802 A max

0 to 70°C -40 to 100°C 0 to 90% non-condensing

I/O Module Racks & Accessories

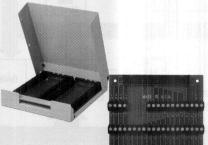


SSR-PB24

Mounting and Interface rack for standard-size solid-state I/O modules. Two racks can be used per board. Use one C100FE-# series cable for two racks. We offer a wide variety of I/O modules

I/O Modules (see pages 177 & 178 for more details)

SSR-ODC-05 0-60 VDC output module SSR-ODC-05A 0-200 VDC output module 24-140 VAC output module SSR-OAC-05 SSR-OAC-05A 24-280 VAC output module 3-32 VDC input module SSR-IDC-05 10-32 VDC / 15-32 VAC input module SSR-IDC-05NP 90-140 VAC input module SSR-IAC-05 24-280 VAC input module SSR-IAC-05A



Screw terminal boards & Boxes

The PCI-DUAL-AC5 signals may be brought out to screw terminals by using the C100FF-2 series cable and the SCB-50 screw connection box (requires one) or the

CIO-MINI-50 screw terminal board (requires two).

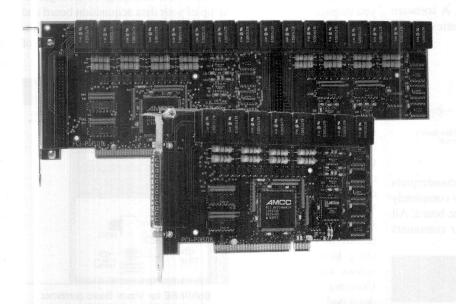
Ordering Guide

PCI-DUAL-AC5

48-bit, dual PB-24 interface and high current, logic-level digital I/O board for PCI-bus computers.

PCI-PDISO16 & PCI-PDISO8

16 and 8 Channel, PCI-bus Compatible, High Voltage, High CurrentDigital I/O Boards



Features

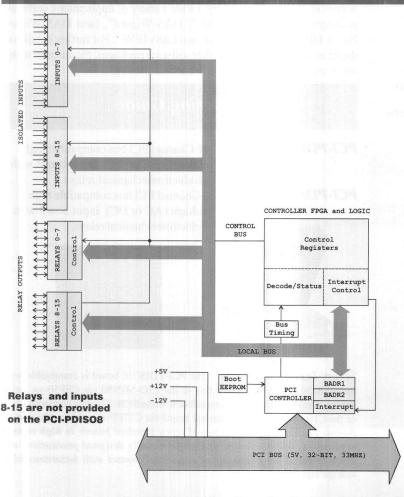
PCI-PDISO16

- 16 high voltage (5V-28V) AC/DC digital input channels
- 16 form C electromechanical relays
- 3 Amp, 120VAC output control
- Register & Connector compatible with CIO-PDISO16

PCI-PDISO8

- 8 high voltage (5V-28V) AC/DC digital input channels
- 5 form C, 3 form A (NO) relays
- 3 Amp, 120VAC output control
- Register & Connector compatible with CIO-PDISO8

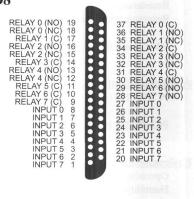
Block Diagram



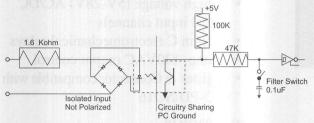
Connector Diagrams

PCI-PDIS	SO16	NC 50		49	NC
	010	NC 48	0 0		NC
		NC 46	0 0		NC
		NC 44	1 0 0		NC
		NC 42	0.6		NC
	RELAY 6 (0 0		
	RELAY 7 (0 0		RELAY 0 (NO
	RELAY 0		0 0		RELAY 0 (NC)
	RELAY 1 (I		0 0		RELAY 1 (C)
	RELAY 1 (RELAY 2 (NO
	RELAY 2				RELAY 2 (NC)
	RELAY 3 (I		0 0	27	
	RELAY 3 (0 0		RELAY 4 (NO
	RELAY 4		0 0	23	
	RELAY 5 (I		0 0	21	RELAY 5 (C)
	RELAY 6 (I			19	RELAY 6 (C)
	RELAY 7 (I	NO) 18	0 0		RELAY 7 (C)
	INPL		0 0	15	INPUT 0
	INPL	IT 1 14	0 0	13	INPUT 1
	INPL	IT 2 12	0 0	11	INPUT 2
	INPL	IT 3 10	0 0	9	INPUT 3
	INPL	IT 4 8	0 0	7	INPUT 4
	INPU	IT 5 6	0 6	5	INPUT 5
	INPL	T 6 4	0 0	3	INPUT 6
	INPL	T7 2	0 0	1	INPUT 7

PCI-PDISO8



The PCI-PDISO16 and PCI-PDISO8 combine isolated AC or DC inputs and electromechanical relays on a single PCI-bus compatible board. The PCI-PDISO16 provides sixteen 24V AC or DC inputs and 16 form C, 3 Amp relays. The PCI-PDISO8 offers eight 24V AC or DC and eight 3 Amp relay outputs (5 form C, 3 form A). A software enabled input filter is available on all channels. A schematic diagram of one of the input channels is shown below.



The boards are fully connector compatible with their ISA counterparts (CIO-PDISO16 & CIO-PDISO8). Both boards are also completely plug-and-play. There are no switches, or jumpers on the board. All board addresses, interrupt channels etc. are set by your computers plug-and-play software.

Specifications

Relay Specifications

Contact Configuration

PCI-PDISO16 16 form C

PCI-PDISO8 5 form C, 3 form A (NO)

Contact Rating 3A @ 120VAC or 28VDC resistive Contact Type Gold overlay silver

Contact Resistance 100 milliohms max
Operate Time 20 milliseconds
Release Time 10 milliseconds max

Vibration 10 to 55 Hz (Dual amplitude 1.5mm)

Dielectric Isolation 500V (1 minute)

Life Expectancy 10 million mechanical operations, min

Isolated Inputs

PCI-PDISO16 16 PCI-PDISO8 8

DC input ranges

Vin low 1.8 V, max Vin high 5 V, min

AC input ranges (50-1000Hz)

Vin low 1.8 Vp-p, max Vin high 5.0 Vp-p, min

Max input voltage 28VDC, or 28VRMS (50-1000Hz)

Isolation 500V

Resistance 1.6 K Ohms min
Response w/o filter 20 uS (without filter)
5 mS (with filter)

Filter Control Individually programmable, Filters disabled on power-up/reset

Power consumption (+5V)

PCI-PDISO16 0.7 A, all relays OFF

2.0 A, all relays ON PCI-PDISO16 0.4 A, all relays OFF

1.0 A, all relays ON

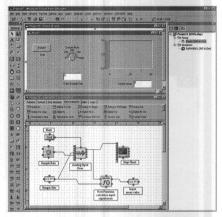
Environmental

Operating / storage temp 0 to 50 °C / -20 to 70 °C Humidity 0 to 90% non-condensing

Software

The PCI-PDISO series boards come complete with Computer Boards' powerful *Insta* CalTM software package. *Insta* Cal is a complete installation, calibration and test program for Computer Boards data acquisition boards. Complete with extensive error checking, *Insta* Cal guides you through installation and setup of your data acquisition board and creates the board configuration file for use by your program or application software package. *Insta* Cal is described in the software section of this handbook.

The boards are fully supported by Computer-Boards' powerful Universal Library. Universal Library is a complete set of I/ Olibraries and drivers for all of our boards, for all Windows based languages. When using the Universal Library you can switch boards or even programming languages and the syntax remains constant. Universal Libraryis fully described in the software section of this handbook.



SoftWIRE for Visual Basic combines the simplicity of graphical programming with the power and flexibility of programming in VB!

The PCI-PDISO series

boards are fully supported by a wide variety of applications software packages including SoftWIRE[™], DAS-Wizard[™], (and DAS-Wizard Pro[™]), HP VEE[®], HP VEE Lab and LabVIEW[™]. For further details on these, as well as a variety of other software packages, please refer to the software section provided earlier in this catalog.

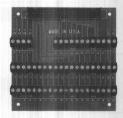
Ordering Guide

PCI-PDISO16

PCI-PDISO8



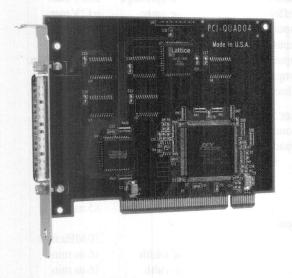
16 Channel PCI bus compatible high voltage (AC or DC) input board with 16 electromechanical relays. 8 Channel PCI bus compatible high voltage (AC or DC) input board with 8 electromechanical relays.



Screw Terminal Boards The PCI-PDIS016 board is compatible with the SCB-50 screw connection box or the CIO-MIN50 via CFF50-xx series cables. The PCI-PDISO8 is compatible with the SCB-37 screw connection box or the CIO-MIN137 screw terminal board via C37FF-xx cables. Computer-Boards cautions against the use of screw terminal boards in high voltage applications unless specific and professionally designed precautions are taken to avoid the possibility of accidental contact with hazardous high voltage signals.

PCI-QUAD04

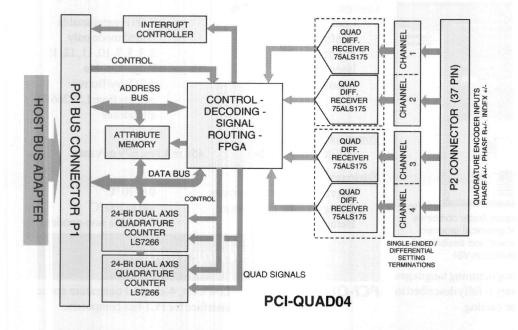
Low Cost, PCI-bus Compatible, 4-Channel Quadrature Encoder Interface



Features

- · Extremely low cost
- Interfaces to industry standard Encoders
- 4 input channels
- Inputs are configurable for single-ended or differential modes.
- An interrupt controller yields powerful interrupt management capabilities.
- Quad receivers can tolerate long lines in noisy environments.
- Uses integrated digital filtering and 8-bit counter prescalers.
- Programmable index functionality provided.
- Programmable multiple-counter modes possible including non-quadrature cascaded counting up to 96 bits.
- Each 24-bit counter can count in either binary or BCD modes.

Block Diagram



I/O Connector & Cables

We recommend the use of the C37F-4X9F-1M fan-out cable. This one-meter long cable fans-out the 37-pin female connector on the board to 4 independant 9-pin connectors (one per each channel). The table below shows the pinout of each of the 9-pin female connectors (P1, P2, P3 & P4) as well as the pinout of the board's main 37-pin male connector.

P1	P5		P3	P5	
1	1	Phase1A-	1	7	Phase3A-
2	2	+5VDC	2	8	+5VDC
3	3	Phase1B-	3	9	Phase3B-
4	4	+5VDC	4	10	+5VDC
5	5	Index1-	5	24	Index3-
6	20	Phase1A+	6	25	Phase3A+
7	21	Phase1B+	7	26	Phase3B+
8	22	Ground	8	27	Ground
9	23	Index1+	9	28	Index3+
P2	P5		P4	P5	
P2	P5 15	Phase2A-	P4	P5	Phase4A-
		Phase2A-+5VDC	_	100	Phase4A-+5VDC
1	15		1	11	
1 2	15 16	+5VDC	1 2	11 12	+5VDC
1 2 3	15 16 17	+5VDC Phase2B-	1 2 3	11 12 13	+5VDC Phase4B-
1 2 3 4	15 16 17 18	+5VDC Phase2B- +5VDC	1 2 3 4	11 12 13 14	+5VDC Phase4B- +5VDC
1 2 3 4 5	15 16 17 18 19	+5VDC Phase2B- +5VDC Index2-	1 2 3 4 5	11 12 13 14 29	+5VDC Phase4B- +5VDC Index4-
1 2 3 4 5 6	15 16 17 18 19 34	+5VDC Phase2B- +5VDC Index2- Phase2A+	1 2 3 4 5 6	11 12 13 14 29 30	+5VDC Phase4B- +5VDC Index4- Phase4A+

The PCI-QUAD04 is a four channel, quadrature encoder input board for PCI bus computers. Based on the popular LS7266 interface chip, the board is both powerful and easy to use.

All connections are made through a 37-pin, male, D connector that extends out the rear of the computer. ComputerBoards offers the C37F-4X9F-1M cable that fans the 37-pin connector out to four 9-pin connectors (one per channel).

The heart of this board is two LS7266, 24-bit dual-axis quadrature counter ICs from LSI Computer Systems. Each LSI IC contains:

- Two 24-bit counters (for a total of four).
- Associated 24-bit preset and output latch registers.
- Integrated digital filtering.
- 8-bit counter prescalers.
- Programmable index functionality.
- Programmable count modes including non-quadrature modes.

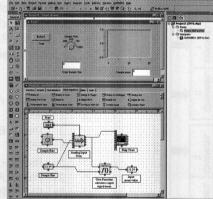
The PCI-QUAD04 is plug and play without requiring the user to set any dip switches in order to install the board. Jumpers on the board are used to select between differential and single ended input modes.

Software

All PCI-QUAD04 boards come with ComputerBoards' powerful InstaCalTM software package. InstaCal is a complete installation, calibration, and test program for ComputerBoards data acquisition boards. Using extensive error checking, InstaCal guides you through installa-

tion and setup of your data acquisition board. It creates the configuration file for use by your program or application software package. InstaCal is fully described in a dedicated manual and our catalog.

The board is fully supported by Computer-Boards' powerful Universal Library. The Universal Library is a complete set of I/O libraries and drivers for all of our boards and for all Windows-based guages. When using Uni-



SoftWIRE for Visual Basic combines the simplicity of graphical programming with the power and flexibility of programming in VB!

versal Library, you can switch boards or even programming languages and the syntax remains constant. Universal Library is fully described in a user's manual and the software section of our catalog.

The PCI-QUAD04 is fully supported by a wide variety of applications software packages including SoftWIRE™, DAS-Wizard™, (and DAS-Wizard Pro™), HP VEE®, HP VEE Lab and Lab VIEW™. For further details on these, as well as a variety of other software packages, please refer to the software section provided earlier in this catalog.

Performance Specifications

Input Section

Receiver type SN75ALS175 quad diff. Configuration Phase A, B and Indexes Common mode input voltage range ±12 V max Differential input voltage range ±12 V max Input sensitivity ±200 mV Input hysteresis 50mV typ. Input impedance 12 kilohm min. Propagation delay 27 ns max. Absolute max input voltage-Diff. ±25 V max.

Counter Section

Counter type LS7266R1 **Ouadrature Mode** Clock frequency 4.3 MHz max Separation 57 ns min Clock pulse width 115 ns min Index pulse width 85 ns min

Count Mode

Clock frequency 30 MHz max Clock A - high pulse width 16 ns min Clock A - low pulse width 16 ns min Filter clock (FCK) 10 MHz

Digital filter rate 10 MHz, softwareselectable divider 1 to 256 in single steps

Crystal oscillator (FCK source)

Frequency 10 MHz Frequency accuracy 100 ppm

Interrupt Controller Section

Controller type 8259 Programmable Configuration Polled mode only Interrupts 2, 3, 5, 7, 10, 11, 12, 15 Interrupt enable Programmable Interrupt sources All Carry/Borrow outputs from LS7266R1, all Indexes

Power consumption

+5 Vdc (PCI-DAS04) 458 mA typ, 679 mA max.

Environmental

Operating temperature range 0 to 70 °C Storage temperature range -40 to 100 °C Humidity 0 to 90% non-condens.

Ordering Guide

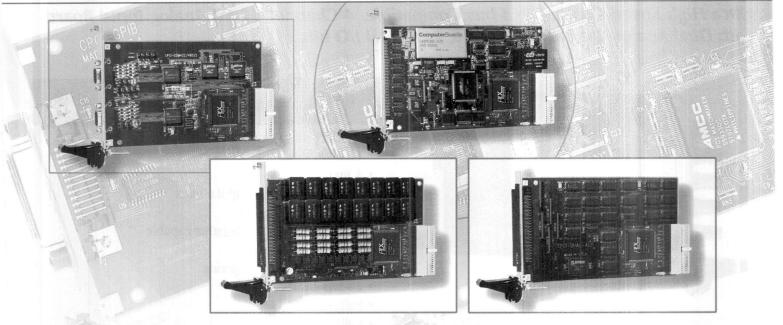
PCI-QUAD04 Low-cost, 4-channel quatrature encoder interface for PCI-bus computers.

C37F-4X9F-1M 37-pin (F) to quad 9-pin (F) fanout cable.

Alternate Connection Modes:

Those not wishing to use the C37F-4X9F-1M cable may use the SCB-37 screw connection box or the CIO-MINI37 screw terminal board with the C37FF-2 series cable.

Data Acquisition & Control for the CompactPCI Bus

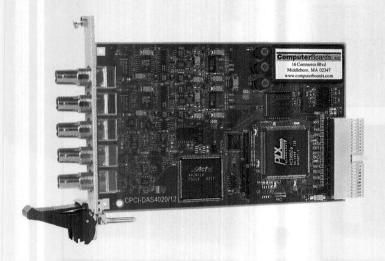


CPCI-DAS4020/12	4-channel, 20-MHz, 12-bit A/D with 24 DIO bits and dual analog outputs	92
CPCI-DAS64/M3/16	64-channel 3-MHz 16-bit A/D w/ 32 DIO bits, one 16-bit CTR & 2 high-speed D/As	96
CPCI-DAS64/M3/16/JR	64-channel 3-MHz 16-bit A/D w/ 32 DIO bits, one 16-bit CTR	96
CPCI-DAS64/M2/16	64-channel 2-MHz 16-bit A/D w/ 32 DIO bits, one 16-bit CTR & 2 high-speed D/As	96
CPCI-DAS64/M2/16/JR	64-channel 2-MHz 16-bit A/D w/ 32 DIO bits, one 16-bit CTR	96
CPCI-DAS64/M1/16	64-channel I-MHz I6-bit A/D w/ 32 DIO bits, one I6-bit CTR & 2 high-speed D/As	96
CPCI-DAS64/M1/16/JR	64-channel I-MHz I6-bit A/D w/ 32 DIO bits, one I6-bit CTR	96
CPCI-DAS6402/16	64-channel 200-kHz 16-bit A/D with 5uS Burst Mode, Prog Gain, 2 100-kHz D/As	100
CPCI-DAS6402/16/JR	64-channel 200-kHz 16-bit A/D with 5uS Burst Mode, Prog Gain	100
CPCI-DAS1200	16-channel 330-kHz 12-bit A/D with 3uS Burst Mode, Prog Gain, 2 D/As	104
CPCI-DAS1200/JR	16-channel 330-kHz 12-bit A/D with 3uS Burst Mode, Prog Gain	104
CPCI-DAS08	8-channel 50-kHz 12-bit A/D board with 7 digital I/O bits	108
Analog Output Boa	rds	
CPCI-DDA08/16	8-channel 16-bit analog output board with 48 bits of digital I/O	110
CPCI-DDA04/16	4-channel 16-bit analog output board with 48 bits of digital I/O	110
CPCI-DDA02/16	2-channel 16-bit analog output board with 48 bits of digital I/O	110
Digital I/O and Cour	nter/Timer Boards	
CPCI-DIO96H	96-bit, High Drive (64mA) digital I/O board	114
CPCI-DIO48H	48-bit, High Drive (64mA) digital I/O board	114
CPCI-DIO24H	24-bit, High Drive (64mA) digital I/O board	116
CPCI-DIO24	24-bit, Standard Drive digital I/O board	116
CPCI-DIO48H/CTR15	48-bit, High Drive (64mA) digital I/O with 15 16-bit counters	119
CPCI-PDISO16	16 Electromechanical relays, 16 isolated (500V) digital input board for the PCI bus	121
CPCI-PDISO8	8 Electromechanical relays, 8 isolated (500V) digital input board for the PCI bus	121
Other CompactPCI	Rus Products	
Suite Southpacti Ci		
CPCI-GPIB	CompactPCI bus GPIB interface, fully IEEE-488.2 compliant, > I-MHz transfer rates	211

Premium Quality, Superior Performance and Low Prices.

CPCI-DAS4020/12

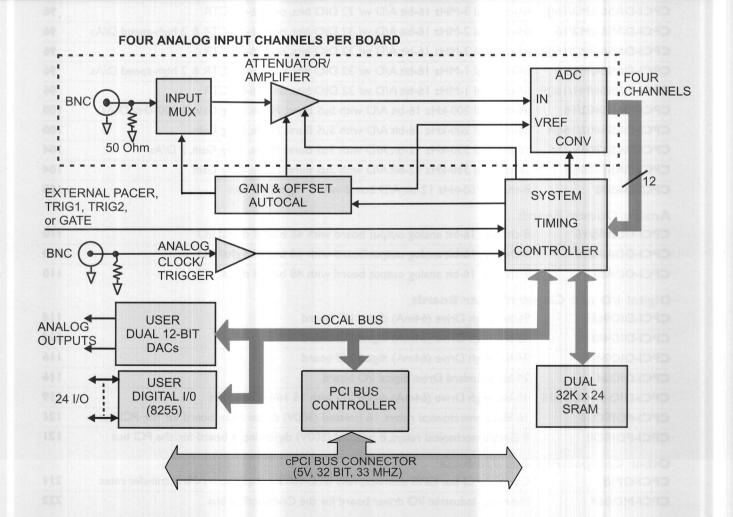
Ultra High-Speed CompactPCI-bus Compatible, 4-Channel, 12-Bit Analog Input Board with Dual Analog Output Channels & 24 Digital I/O bits



Features

- 20 MHz sample rate
- 12-bit A/D resolution
- 4 input channels
- Software selectable input ranges
- One A/D per channel
- Bus-master & Scatter-gather capable
- Dual 12-bit D/As
- · Analog and digital triggering
- 24-bits digital I/O
- Fully Plug-and-Play
- Fully Autocalibrating

Block Diagram



The CPCI-DAS4020/12 is an ultra high speed, analog input board for CompactPCI bus computers. Offering four 12-bit analog inputs with sample rates up to 20 MHz, 24 bits of high drive digital I/O and two 12-bit analog outputs.

At the heart of the board is a powerful System Timing Controller (STC) chip. The STC chip controls all A/D sampling as well as controlling the 64-k sample A/D FIFO. This functionality is based on the STC chip's use of an on-board $32\,k\,x\,24\,SRAM$. The board provides bus-mastering and scatter-gather functionality to assure the desired system timing is maintained.

The CPCI-DAS4020/12 is completely plug-and-play. There are no switches, jumpers or potentiometers on the board. All board addresses, interrupt channels, etc. are set by your computer's plug-and-play software. Even calibration is performed via software by using on-board digital potentiometers and trim D/A converters.

Analog Inputs

The CPCI-DAS4020/12 provides four 12-bit analog inputs. These inputs as well as the trigger input are provided at standard BNC connectors. Each channel on the board offers a 20 MHz maximum sample rate. CompactPCI bus bandwidth limits data transfer to 80 MByte per second. Since each 12-bit sample requires two bytes, the board's total aggregate sample rate is limited to 40 MHz. However, data may be written at full speed into the board's large 64-k Sample buffer memory. The table below shows the data transfer limitations of the board.

Inputs	Sample Rate	Total Board	
sampled	Each Channel	Sample rate	Sample duration
1	20 MHz	20 MHz	Continuous
2	20 MHz	40MHz	Continuous
4	10MHz	40MHz	Continuous
4	20 MHz	80MHz	for 64,000 samples

Software also selects between the ± 5 V (2.44 mV resolution) and ± 1 V (0.488 mV resolution) analog input ranges.

Simultaneous Sampling

Using the CPCI-DAS4020/12's four A/D converters allows you to sample all inputs simultaneously. Channel-to-channel skew normally associated with a multiplexed A/D is not a concern on the CPCI-DAS4020/12.

Trigger & Clock Modes

The CPCI-DAS4020/12 provides great flexibility in allowing you to match your sample timing to your application. Sample rates from 20 MHz to 2 kHz may be based on the board's internal crystal controlled clock or samples may be synchronized to a user supplied clock source.

The board supports both analog and digital input triggers and gates. Triggered or gated sampling may be based on rising edges, falling edges (high or low levels for gated operation) with the analog trigger level set with 2.44 mV resolution within the $\pm 5 \text{ V}$ trigger input range.

The CPCI-DAS4020/12 also supports pre-trigger, post-trigger and about trigger modes.

Analog Outputs

The CPCI-DAS4020/12 provides two channels of 12-bit analog output. Software selectable output ranges of ± 10 V and ± 5 V are provided, and channels may be set at different ranges. The D/A outputsdrive up to ± 5 mA, are short circuit protected (25 mA limit) and are cleared to 0 volts on power up or reset. The analog outputs are controlled via programmed I/O commands. On power up or system reset both analog outputs are cleared to 0 volts.

Parallel Digital I/O

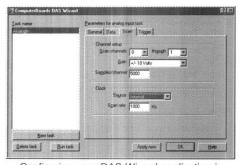
The CPCI-DAS4020/12 provides 24 bits of parallel, digital I/O through the 40-pin auxilliary connector. This port is pin compatible with ComputerBoards' popular DIO-24 series boards. The digital I/O is provided in the form of two 8-bit ports, and two 4-bit ports. Each of the ports to be set independently as input or output.

This digital capability is based on the popular 82C55 interface chip. Output drive capability is 2.5 mA at 0.5 Vmax or 2.5 mA at 2.0 Vmin, which provides enough drive for many common interface requirements. For higher drive requirements you may take advantage of the wide variety of boards and products shown in the digital signal conditioning section of this catalog. All ports default to the input state on power up/reset.

Software

All CPCI-DAS4020/12 boards come complete with ComputerBoards' powerful *Insta*CalTM software package. *Insta*Cal is a complete installation, calibration and test program for ComputerBoards data acquisition and control boards. Complete with extensive error checking, *Insta*Cal guides you through installation and setup of your data acquisition board, and creates the board configuration file for use by your program or application software package. *Insta*CAL is described in detail within the software section of this catalog.

The CPCI-DAS4020/12 boards are fully supported by ComputerBoards' powerful Universal Library. Universal Library is a complete set of I/O libraries and drivers for all of our boards, for all Windows based languages. When using the Universal Library you can switch boards or even programming



Configuring your DAS-Wizard application is extremely easy. In just a few seconds you'll click *Run Task* and your data will be placed directly into your Excel spreadsheet.

languages and the syntax remains constant. Want to change programming languages? The Universal Library requires no relearning. For details on Universal Library, please refer to the software section of this catalog.

The CPCI-DAS4020/12 boards are fully supported by a wide variety of applications software packages including SoftWIRE™, DAS-Wizard™, (and DAS-Wizard Pro™), HP VEE®, HP VEE Lab and LabVIEW™. For further details on these, as well as a variety of other software packages, please refer to the software section provided earlier in this catalog.

CPCI-DAS4020/12 Specifications

Analog input section

Resolution 12 bits
Programmable ranges ±5V,±1V

Number of channels 4 single-ended, 1 A/D per channel

Coupling DC

A/D conversion time 40 nS
Input Bandwidth 10 MHz

Maximum Sample Rates

Single Channel 20 MHz continuous
Two Channels 20 MHz continuous*
Four Channels 10 MHz continuous*
20 MHz for 64 k samples*

*each channel sampled at rate shown

Data transfer Via dual 32 kx24 sample FIFO, with Bus-Master DMA, scatter-

gather, interrupt, or software polled

Minimum sample rate 2 kHz

Differential Linearity error ±.4 LSB typ, ±1.0 LSB max Integral Linearity error ±1.0 LSB typ, ±2.5 LSB max

 $\begin{array}{ll} \mbox{Gain drift} & \pm 0.4 \mbox{ ppm/}^{\circ}\mbox{C} \\ \mbox{Reference:} & \pm 3 \mbox{ ppm/}^{\circ}\mbox{C max} \\ \mbox{Zero drift (A/D specs)} & \pm 2 \mbox{ppm/}^{\circ}\mbox{C} \\ \end{array}$

Input leakage current 2 uA typ, 10 uA max

Input Impedance 2.5 kilohms or 50 ohms, solder gap

selectable

Absolute max input voltage ±15V

A/D Pacer

A/D Pacer Programmable: Internal counter,

External source or software polled

External Pacer Clock Rate 20 MHz max, 1 kHz min

Duty Cycle $50\% \pm 5\%$

A/D Trigger input

A/D Trigger Sources Internal software, External Digital

or External Analog

Internal Software:

Software commands the start of a scan of conversions

External digital:

Software configurable for rising or falling edge trigger, or high

or low level gate. Input is LS TTL compatible

External analog:

Software selectable trigger source can be the EXTATRIG BNC

connector or any of the A/D inputs.

Input Range ±5V

Trigger level setting 2.44 mV resolution

Bandwidth 10 MHz Coupling DC

Hysteresis: Programmable

Trigger/Gate Levels Software configurable for above/

below reference levels or in/out

of window

Pre- / Post-trigger:

Circular buffer allows unlimited pre-trigger conversions. 16M post-trigger conversion capability.

Analog Output

Resolution 12 bits Number of channels 2

Output Range $\pm 10V$, ± 5 software selectable

D/A pacing Software paced
Data transfer Programmed I/O

Offset error ±9mV max
Gain error ±2LSB max
Monotonicity Guaranteed
D/A Gain drift ±15 ppm/°C max
D/A Bipolar offset drift ±5 ppm/°C max
Throughput System Dependent

Settling time 5 μ s max (20V step to $\pm \frac{1}{2}LSB$)

Slew Rate $7V/\mu s$ Current Drive $\pm 5 \text{ mA}$

Output short-circuit duration 25 mA indefinite

Output coupling DC

Output impedance 0.5 ohms max

Miscellaneous Single buffered output latch

Update DAC's individually On power-up and reset, both DAC's cleared to 0 volts

Digital Input / Output

Connector type 40-pin connector header

I/O ports 24

Configuration 2 banks of 8, 2 banks of 4,

8255 Mode 0 emulation

Input Device 74LS373 Output Device 74S244

Interrupts INTA# - mapped to IRQn via cPCI

BIOS at boot-time

Interrupt enable Software programmable or

External enable provided at AUX

connector.

Interrupt sources External, internal FIFO status

Crystal oscillator

Frequency 40 MHz Frequency accuracy ±50 ppm Dutu cycle 50%

Power consumption

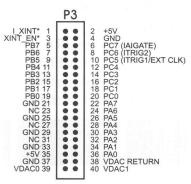
+5V 3.1 A typical, 3.6 A max

Environmental

Operating temperature range 0 to 70 °C Storage temperature range -40 to 100 °C

Humidity 0 to 90% non-condensing

pins 38-40, the analog output pins are not available on the 37 pin connector.



*PINS 1 & 3 HAVE 10K PULL-UP RESISTORS INSTALLED.

PCI-DAS4020/12 Connector Diagram

Channel 2

Channel 3

View from rear of the PC.

Trigger Input

aiso sen canoraung. Standard canoradon techniques require à channer to be calibrated with zero volts input (offset calibration) and with a known input voltage (gain calibration). The PCI-DAS4020/12 provides on-board circuitry that will short the inputs allowing offset calibration, and then connect the inputs to an ultra-stable, on-board voltage reference for the gain calibration. A complete PCI-DAS4020/12 calibration is as simple as issuing a single software command.

For a complete discussion of ComputerBoards unique and powerful auto-calibration and self-calibration techniques, please refer to our Auto- and Self-Calibration tutorial on page 270.

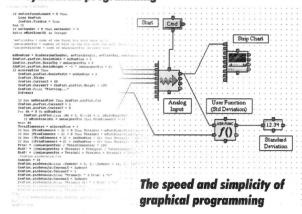
Ordering Guide

CPCI-DAS4020/12

4-channel, 20MHz, 12-bit A/D, D/A & digital I/O board for CPCI-bus computers.



The power and flexibility of syntactical programming



Introducing SoftWIRE™

Graphical Programming in Visual Basic®

Syntactical programming has been around since the early days of computers. More recently, graphical programming languages have been introduced and are now a popular alternative to writing hard core, text-based syntax. What's been lacking is an easy way to combine the speed and ease of use of graphical programming with the flexibility and efficiency of writing code in an industry standard language. Until now—Introducing SoftWIRE.

For more information on SoftWIRE, please see pages 6 -10 in this catalog.

CPCI-DAS64/Mx/16 & CPCI-DAS64/Mx/16/JR family

Ultra High-Speed CompactPCI-bus Compatible, 16-bit, 64-Channel Analog Input Board with

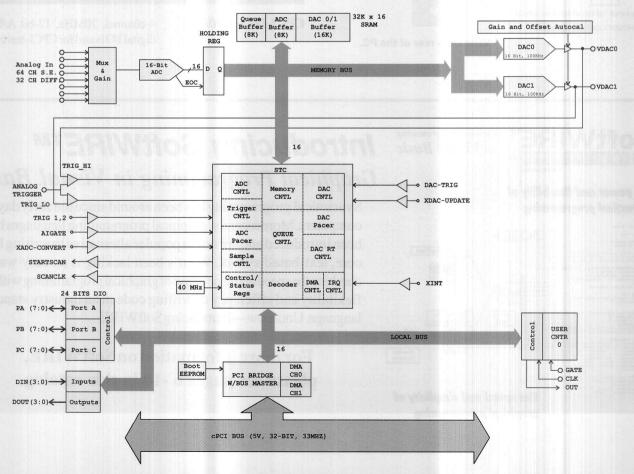
Dual Analog Output Channels & 32 Digital I/O bits

ComputerBoards

Features

- Ultra High Speed 16-bit Sample Rates CPCI-DAS64/M3/16 - 3 MHz CPCI-DAS64/M2/16 - 2 MHz CPCI-DAS64/M1/16 - 1 MHz
- 64 channel single-ended / 32 chan diff
- 16-bit A/D resolution
- 8192 sample gain/channel queue
- Bus-master & scatter-gather support
- Analog trigger input (not avail on /JR)
- Burst-Mode SS&H emulation
- 8192 sample A/D FIFO
- Dual 16-bit D/As (not avail on /JR)
- 100 kHz D/A update rate (16-k FIFO)
- One 16-bit counter/32-bits, digital I/O
- Fully Plug-and-Play & Autocalibrating

Block Diagram



The CPCI-DAS64/Mx/16 family of analog and digital I/O boards offer an incredible combination of high speed, channel count and resolution on a single CompactPCI-bus data acquisition board. Offering 64 single-ended or 32 differential 16-bit analog inputs with sample rates up to 3 MHz (single-channel, up to 1.5 MHz multi-channel), two 16-bit analog outputs (no outputs on /JR version), 32 bits of digital I/O and one 16-bit down counter. The board offers a variety of analog and digital trigger modes with software selectable trigger levels and direction.

At the heart of the board is ComputerBoards' powerful System Timing Controller (STC) chip. The STC chip controls all A/D sampling and D/A update rates as well as controlling the 8K A/D FIFO, the 8K gain/channel queue and the 16K D/A FIFO. This functionality is based on the STC chip's use of an on-board 32K x 16 SRAM. The STC chip assigns functions to various parts of the SRAM (e.g. A/D FIFO) and then provides full speed control and arbitration among the various functions using the various sections of the SRAM buffer.

The STC allows simultaneous full speed A/D sampling, D/A updating and gain/channel queue sequencing (with variable intersample timing if desired). The STC chip performs these functions up to 5 MHz, and is available as an OEM component for use in your own designs. The board provides bus-mastering and scatter-gather functionality to assure the desired system timing is maintained.

The CPCI-DAS64/Mx/16 family is completely plug-and-play. There are no switches, jumpers or potentiometers on the board. All board addresses, interrupt channels etc. are set by your computers plug-and-play software. Even calibration is performed via software by using on-board trim D/A converters. (For more details on our digital calibration techniques, please see our calibration tutorial on page 268).

Analog Inputs

The CPCI-DAS64/Mx/16 provides 32 fully differential or 64 single-ended analog inputs. The input mode is software selectable, with no switches or jumpers to set. The CPCI-DAS64/M3/16 board offers a 3 MHz maximum sample rate, while the /M2/16 and /M1/16 offer 2 MHz and 1 MHz sample rates. The boards offer full speed acquisition in single channel scans, and will perform full accuracy multichannel scans at 1.5 MHz regardless of gain setting. An 8-k sample gain/channel queue is available making long, complex sample sequencing simple. An 8-k sample FIFO combine with Bus-Master DMA and scatter-gather to assure data taken from the board is transferred into computer memory without the possibility of missed samples.

The table below details the input ranges and resolutions for the available input configurations and gains.

Bipolar		Unipolar			
Range	Resolution	Range	Resolution		
±5V	153 uV	0 - 10V	153 uV		
±2.5V	76.3 uV	0 - 5V	76.3 uV		
±1.25V	38.1 uV	0-2.5V	38.1 uV		
±0.625V	19.1 uV	0-1.25V	19.1 uV		

Burst Mode

Channel-to-channel skew is the result of multiplexing the A/D inputs and is defined as the time between consecutive samples. Burst mode minimizes channel-to-channel skew by clocking the A/D at a high rate between successive samples within a scan, then waiting a specified time before starting an new scan. The CPCI-DAS64/Mx/16 provides burst mode with a 667 nS (1 uS on M1) minimum sample skew/delay.

Analog Outputs (there are no analog outputs on the/JR version)

The CPCI-DAS64/Mx/16 boards provide two high speed 16-bit analog outputs. The outputs are updated via on-board 16 K FIFO and provide a 100 kHz max. update rate. Repetitive D/A-based waveforms can be stored in on-board memory and generated without requiring ongoing PCI bus transfers. Software selectable ranges of 0-10V, 0-5V, ±10V and ±5V are provided, and channels may be set at different ranges. The outputs provide rated accuracy to ±20 mA, are short circuit protected (35 mA limit) and are cleared to 0 volts on power up or reset. The board supports simultaneous full speed operation of both the A/D and D/A.

Parallel Digital I/O

The CPCI-DAS64/Mx/16 provides 32 bits of digital I/O. An 82C55 chip provides 24 bits of CMOS compatible I/O at the board's 40-pin auxiliary connector. Four LSTTL compatible digital inputs and four outputs are also provided on the main 100-pin connector. On power up or reset, all I/O ports default to the input state (high impedance).

Counter/Timer I/O

The CPCI-DAS64/Mx/16 provides one 16-bit down counter (1/3 of an 82C54). The counter provides clock, gate and output connections at the user I/O connector.

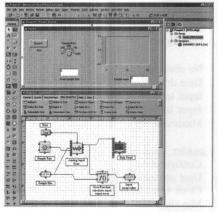
Installed in any CompactPCI-bus compatible personal computer the CPCI-DAS64/Mx/16 turns your personal computer into a ultra high-speed data acquisition and control station.

Software

All CPCI-DAS64/Mx/16 boards come complete with ComputerBoards' powerful *Insta*Cal[™] software package. *Insta*Cal is a complete installation, calibration and test program for ComputerBoards data acquisition and control boards. Complete with extensive error checking, *Insta*Cal guides you through installation and setup of your data acquisition board and creates the board configuration file for use by your program or application software package. *Insta*Cal is described in detail within the software section of this handbook.

The CPCI-DAS64/Mx/16 boards are fully supported by ComputerBoards' powerful Universal Library. Universal Library is a complete set of I/O libraries and drivers for all of our boards, in all Windows based languages. When using the Universal Library you can switch boards or even programming languages and the syntax remains constant. For details on Universal Library, please refer to the software section of this handbook.

The CPCI-DAS-64/Mx/16 boards are fully supported by a wide variety of applications software packages including SoftWIRE™, DAS-Wizard™, (and DAS-Wizard Pro™), HPVEE®, HPVEELab and LabVIEW™. For further details on these, as well as a variety of other software packages, please refer to the software section provided earlier in this catalog.



SoftWIRE for Visual Basic combines the simplicity of graphical programming with the power and flexibility of programming in VB!

1		1		JOV MILE	D/A Gain drift	±15 ppm/°C max
			1 3	Counties	D/A Bipolar offset drift	±5 ppm/°C max
Multiple channel, switching witching Bipolar/Unipolar		500 kHz	500 kHz	500 kHz	D/A Unipolar offset drift	±3 ppm/°C max
					Throughput	100 kHz, 2 channels simultaneous.
fultiple channel, switching	Unipolar/		1000		Settling time (20 V step to	.0008%) 13 μs max
ipolar mode, single input	gain	750 kHz	750 kHz	750 kHz	Settling time (10 V step to	.0008%) 6µs typ
		Liver I	The Carlot	E TOTAL DE LA CONTRETA	Slew Rate	10V Ranges 10.7 V/uS
FRO THEN E DIST A DESCRIP			Add Add			5V Ranges 10.7 V/uS
Data transfer modes		2 sample FIFO		ster DMA,		A THE RESIDENCE OF THE PROPERTY OF THE
		t, or software			Current Drive	±5 mA min
Programmable ranges		.5V, ±1.25V,			Short-circuit current	±35 mA indefinite
	0 - 10V,	0 - 5V, 0 - 2.5	6V, 0 - 1.25V		Output Coupling / impeda	nce DC / 0.1 ohms max
					Miscellaneous	Power up/reset, all DAC's set to 0 volt
A/D pacing		mable: interr		external		Markey-Inthintiple to 14 c
		or software po	olled		Digital Input / Output	
Channel/gain queue	8192 sa	mples.			Digital Bits	32
Burstmode timing	Software	e selectable o	ption, skew	= 667 nS	Configuration	24-bit, 82C55 at Aux 40-pin connector
	(1 uS or	the /M1 boa	ard)			4 dedicated input & 4 dedicated output bit
						on 100-pin main connector
A/D Trigger sources	External	: analog or dig	gital		82C55 Specifications	on 100 pm main connector
A/D Triggering Modes					Configuration	2 banks of 8, 2 banks of 4, programmable
Digital: SW configur					Comiguration	bank as input or output
(gated). Programmable	polarity (ri	sing/falling e	dge, high/low	gate).	Default/Reset State	Input, High Impedance
					Output High	2.4 volts @ -2.5 mA min
Analog: SW configu	rable for ab	ove/below re	ference, in/ou	t window	Output High	
and hysteresis. Program	mmable pol	arity (rising/fa	alling edge tri	gger,		0.5 volts @ 2.5 mA min
high/low gate). Trigge					Input High	2.0 volts min, 7 volts absolute max
triggering is not availa				AN HOLY	Input Low	0.8 volts max, -0.5 volts absolute min
Middle and Long areas in	itilis ration	g:41	11 (11)		Dedicated I/O bits (4 inp	ut, 4 output)
Pre-trigger: Unlimit					Input / Output device:	74LS175
Compatible with Digit	al and Anal	og trigger mo	odes		Default/Reset State	All 4 outputs to logic low
Diff I in a miter annual	. 1 I CD	2756			Output High	2.4 volts @ -0.4 mA min
Diff. Linearity error	±1 LSB				Output Low	0.5 volts @ 8.0 mA min
Integral Linearity error	±1.5 LS				Input High	2.0 volts min, 7 volts absolute max
Gain Error	22.5 ppr	n typ, 45 ma	X		Input Low	0.8 volts max, -0.5 volts absolute min
No missing codes	16- bits	guaranteed				
Gain drift / Zero drift		/°C / ±45 ₁	opm/°C		Interrupts	INTA# - mapped to IRQn via cPCI BIOS
Input leakage current	2.3 nA		F.m. O			boot-time
Input impedance	10 ¹¹ ohr				Interrupt enable	Software programmable
Maximum input voltage	±35 V	iio, typ			Interrupt sources	External (rising TTL edge event) or a variety
input rottage					Vol.97	of internal FIFO status sources
ounter section						
Configuration	Single 16	bit down co	ounters 1/3 820	C54	Power consumption	
User connections		Gate and C			+5V Operating	3.0 A typical, 3.7 A max
Clock input frequency		Hz max	111111			

10 MHz max Min clock pulse width 30 nS high, 50 nS low

Gate width high or low 50 nS min

Input low / high voltage 0.8V max / 2.0V min Output low / high voltage 0.4V max / 3.0V min

Environmental

Operating temperature range Storage temperature range

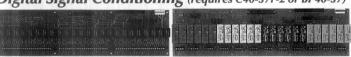
0 to 70 °C -40 to 100 °C

Humidity

0 to 90% non-condensing

Signal Conditioning & Accessories

Digital Signal Conditioning (requires C40-37F-2 or BP40-37)



CIO-ERB08* 8 channel relay rack with 6 Amp, Form C relays CIO-ERB24* 24 channel relay rack with 6 Amp, Form C relays 24 channel relay rack with 10 Amp, socketed and field CIO-SERB24*

replaceable Form Crelays.

SSR-RACK08* 8 channel solid state I/O module rack. 24 channel solid state I/O module rack. SSR-RACK24*

BNC Connector Interface Boxes



BNC-16SE BNC interface box for single-ended mode. Four are

required to connect all 64 channels.

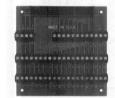
BNC-16DI BNC interface box for differential mode. Four are

required to connect to all 32 channels.

Screw Terminal Accessory Boards and Boxes **SCB-Series & CIO-MINI series**



The main 100-pin connector is compatible with the C100HD-03 cable and the SCB-50 (1 required) or CIO-MINI50 (2 required). The C100HDS-03 series shielded cable provides maximum noise immunity and is compatible with the SCB-100 screw terminal interface box. The auxilliary digital connector is compatible with the CIO-MINI40 using the C40FF-2 cable.



* Items denoted with an asterisk are available with detachable screw terminals.

Auto-Calibration / Self-Calibration

In keeping with general plug-and-play standards, the CPCI-DAS64/Mx/ 16 boards have no switches, jumpers or potentiometers. Auto-calibration is performed with digital potentiometers and/or trim D/A converters. Unlike some boards that use software lookup tables for postacquisition error correction, the CPCI-DAS64/Mx/16 board's data is accurate when written into your computer's memory. The calibration factors that control the digital trim components are stored in EEPROM on the board. You can remove the board from one computer, install it in another, and it will still provide calibrated data.

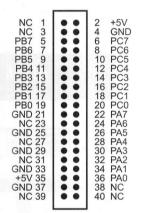
The CPCI-DAS64/Mx/16 board is also self calibrating. The CPCI-DAS64/Mx/16 provides on-board circuitry that grounds the inputs for offset calibration, and connects the inputs to an ultra-stable, on-board voltage reference for gain calibration. A complete CPCI-DAS64/Mx/16 calibration is as simple as issuing a single software command.

For a complete discussion of ComputerBoards unique and powerful auto-calibration and self-calibration techniques, please refer to our Auto- and Self-Calibration tutorial on page 270.

I/O Connector & Cables

All analog, triggering and counter/timer connections are through a 100pin high-density connector. The C100HD50-03 series cable splits the 100 pins into separate 50-pin cables. The first 50-pin cable contains the signals from pins 1-50, while the second carries pins 51-100. These 50pin connectors are compatible with the SCB-50, CIO-MINI50, and BNCseries of interconnects. To minimize noise pickup, use the C100HDS-03 series shielded cable along with the SCB-100 shileded interconnection box. The 24-bits of high current digital I/O are available on an 40 pin header. From the 40-pin header the user connect to the optional BP40-37 which brings these pins out to the standard 37-pin connector and installs in any unused slot. This 37-pin connector is then pin compatible with all DIO24 series boards (and all of our 8 and 24-bit digital signal

conditioning boards). Alternatively, the 40-pin header may be brought out directly with the C40FF-2 cable and connected directly to a CIO-MINI40 screw terminal



Auxiliary/Digital Connector Diagram



IN16HI IN48/IN16LO IN17HI IN49/IN17LO IN18HI IN50/IN18LO IN19HI IN51/IN19LO IN51/IN19LO IN20HI IN52/IN20LO IN21HI IN53/IN21LO IN22HI IN54/IN22LO IN34/IN22LO IN23HI IN55/IN23LO LLGND IN24HI IN24HI IN56/IN24LO IN25HI IN57/IN25LO IN26HI IN58/IN26LO IN27HI IN59/IN27LO IN28HI IN60/IN28LO IN29HI IN61/IN29LO IN61/IN29LO IN30HI IN62/IN30LO IN31HI IN63/IN31LO DOUT0 DOUT1 DOUT2 DOUT2 DOUT3 GND +12V GND -12V DIN2 DIN3 SCANCLK BUF EXTDACUPDATE DACTRIG AIGATE XINT GND

LLGND IN16HI

Ordering Guide

CPCI-DAS64/M3/16

CPCI-DAS64/M3/16/JR

CPCI-DAS64/M2/16

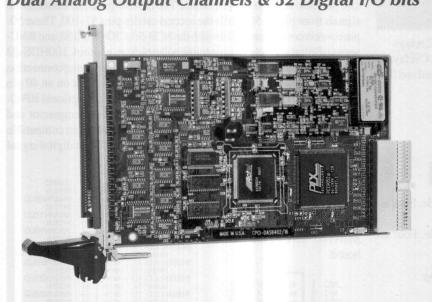
CPCI-DAS64/M1/16

CPCI-DAS64/M1/16/JR

64-channel, 3MHz, 16-bit analog & digital I/O board for PCI-bus computers. 64-channel, 3MHz, 16-bit A/D & digital I/O board for PCI-bus computers. 64-channel, 2MHz, 16-bit analog & digital I/O board for PCI-bus computers. **CPCI-DAS64/M2/16/JR** 64-channel, 2MHz, 16-bit A/D & digital I/O board for PCI-bus computers. 64-channel, 1MHz, 16-bit analog & digital I/O board for PCI-bus computers. 64-channel, 1MHz, 16-bit A/D & digital I/O board for PCI-bus computers.

CPCI-DAS6402/16 & CPCI-DAS6402/16/JR

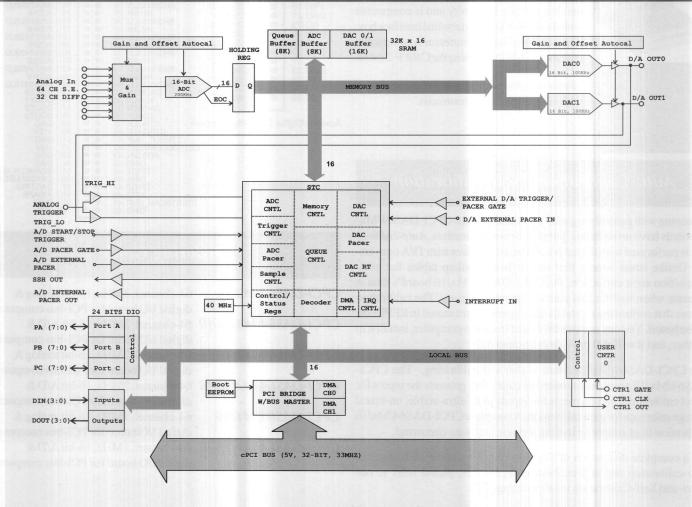
High-Speed CompactPCI-bus Compatible, 16-bit, 64-Channel Analog Input Board with Dual Analog Output Channels & 32 Digital I/O bits



Features

- 64 channel single-ended / 32 chan diff
- 16-bit A/D resolution
- 200 kHz sample rate
- 8192 sample gain/channel queue
- Bus-master & scatter-gather support
- Analog trigger input (not avail on /JR)
- Burst-Mode SS&H emulation
- 8192 sample A/D FIFO
- Dual 16-bit D/As (not avail on /JR)
- 100 kHz D/A update rate (16-k FIFO)
- Provides arbitrary waveform generation
- One 16-bit counter/32-bits, digital I/O
- Fully Plug-and-Play & Autocalibrating

Block Diagram



The CPCI-DAS6402/16 analog and digital I/O board sets a new standard for high channel count, high resolution data acquisition on the CompactPCI-bus. Offering 64 single-ended or 32 differential 16-bit analog inputs with sample rates up to 200 kHz (single-channel or multichannel sampling), two 16-bit analog outputs (no analog outputs on / JR version), 32 bits of digital I/O and one 16-bit down counter. The board offers a variety of analog and digital trigger modes with trigger levels and direction selectable by software.

At the heart of the board is ComputerBoards' powerful System Timing Controller (STC) chip. The STC chip controls all A/D sampling and D/A update rates as well as controlling the 8K A/D FIFO, the 8-k gain/channel queue and the 16-k D/A FIFO. This functionality is based on the STC chip's use of an on-board 32K x 16 SRAM. The STC chip assigns functions to various parts of the SRAM (e.g. A/D FIFO) and then provides full speed control and arbitration among the various functions using the various sections of the SRAM buffer.

The STC allows simultaneous full speed A/D sampling, D/A updating and gain/channel queue sequencing (with variable intersample timing if desired). The STC chip performs these functions up to 5 MHz, and is available as an OEM component for use in your own designs. The board provides bus-mastering and scatter-gather functionality to assure the desired system timing is maintained.

The CPCI-DAS6402/16 is completely plug-and-play. There are no switches, jumpers or potentiometers on the board. All board addresses, interrupt channels etc. are set by your computers plug-and-play software. Even calibration is performed via software by using on-board trim D/A converters. (For more details on our digital calibration techniques, please see our calibration tutorial on page 270).

Analog Inputs

The CPCI-DAS6402/16 provides 32 fully differential or 64 single-ended analog inputs. The input mode is software selectable, with no switches or jumpers to set. The board offers a 200 kHz maximum sample rate in single and multichannel scans at any gain setting. An 8 kilosample gain/channel queue is available making long, complex sample sequencing simple. An 8-k sample FIFO assures data taken from the board is transferred into computer memory without the possibility of missed samples.

Software or the gain/channel queue selects the bipolar/unipolar input configuration as well as selecting among the input ranges. The table below details the input ranges and resolutions for the available input configurations and gains.

Bipolar		Unipolar			
Range	Resolution	Range	Resolution		
±10V	305 uV	0 - 10V	153 uV		
±5V	153 uV	0 - 5V	76.3 uV		
±2.5V	76.3 uV	0-2.5V	38.1 uV		
±1.25V	38.1 uV	0-1.25V	19.1 uV		

Burst Mode

Channel-to-channel skew is the result of multiplexing the A/D inputs and is defined as the time between consecutive samples. Burst mode minimizes channel-to-channel skew by clocking the A/D at a high rate between successive samples within a scan, and then waiting a specified time before starting an new scan. The CPCI-DAS6402/16 provides burst mode with a 5 uS minimum sample skew/delay.

Analog Outputs (there are no analog outputs on the/JR version)
The CPCI-DAS6402/16 provides two high speed 16-bit analog outputs.
The analog outputs are updated via on-board 16-k FIFO and provide a
100 kHz max. update rate. Repetitive D/A-based waveforms can be
stored in on-board memory and generated without requiring ongoing
CompactPCI bus transfers. Software selectable ranges of 0-10V, 0-5V,
±10V and ±5V are provided, and channels may be set at different ranges.
The outputs provide rated accuracy to ±5 mA, are short circuit protected
(35 mA limit) and are cleared to 0 volts on power up or reset. The board

Parallel Digital I/O

The CPCI-DAS6402/16 provide 32 bits of digital I/O. An 82C55 chip provides 24 bits of CMOS compatible I/O at the board's 40-pin auxilliary connector. Four LSTTL compatible digital inputs and four outputs are also provided on the main 100-pin connector. On power up or reset, all I/O ports default to the input state (high impedance).

supports simultaneous full speed operation of both the A/D and D/A.

Counter/Timer I/O

The CPCI-DAS6402/16 provides one 16-bit down counter (1/3 of an 82C54). The counter provides clock, gate and output connections at the user I/O connector.

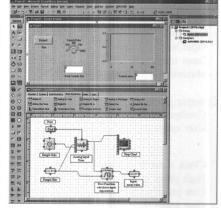
Installed in any CompactPCI-bus compatible personal computer the CPCI-DAS6402/16 turns your personal computer into a high speed, high resolution data acquisition and control station.

Software

All CPCI-DAS6402/16 boards come complete with ComputerBoards' powerful *Insta*CalTM software package. *Insta*Cal is a complete installation, calibration and test program for ComputerBoards data acquisition and control boards. Complete with extensive error checking, *Insta*Cal guides you through installation and setup of your data acquisition board and creates the board configuration file for use by your program or application software package. *Insta*Cal is described in detail within the software section of this handbook.

The CPCI-DAS6402/16 boards are fully supported by ComputerBoards' powerful Universal Library. Universal Library is a complete set of I/O libraries and drivers for all of our boards, in all Windows based languages. When using the Universal Library you can switch boards or even programming languages and the syntax remains constant. For details on Universal Library, please refer to the software section of this handbook.

The CPCI-DAS-6402/16 boards are fully supported by a wide variety of applications software packages including SoftWIRE™, DAS-Wizard™, (and DAS-Wizard Pro™), HP VEE®, HP VEE Lab and LabVIEW™. For further details on these, as well as a variety of other software packages, please refer to the software section provided earlier in this catalog.



SoftWIRE for Visual Basic combines the simplicity of graphical programming with the power and flexibility of programming in VB!

CPCI-DAS6402/16 Specifications

Analog input section

Resolution 16-bits

Number of channels 32 diff/64 SE, Software selectable

A/D conversion time 5 µs

Sample rate 200 kHz (single or multiple channel)

Sample rates with gain/channel queue

Single channel, single input range 200 kHz Multiple channels, same input range 200 kHz

Single or multiple channels, changing input ranges, all channels in the same

unipolar or bipolar mode 200 kHz

Single or multiple channel, changing input ranges, channels in both unipolar

and bipolar modes 200 kHz

Data transfer modes via 8192 sample FIFO and Bus master DMA,

interrupt, or software polled

Programmable ranges $\pm 10V$, $\pm 5V$, $\pm 2.5V$, $\pm 1.25V$, 0 - 10V,

0 - 5V, 0 - 2.5V, 0 - 1.25V

A/D pacing Programmable: internal counter or external

source or software polled

Channel/gain queue 8192 samples.

Burstmode Software selectable option, skew = 5µs

A/D Trigger sources External: analog or digital

A/D Triggering Modes

Digital: SW configurable for Edge (triggered) or level-activated (gated). Programmable polarity (rising/falling edge, high/low gate).

Analog: SW configurable for above/below reference, in/out window and hysteresis. Programmable polarity (rising/falling edge trigger, high/low gate). Trigger levels set by DAC0 and/or DAC1. (Analog triggering is not available on the /JR version)

Pre-trigger: Unlimited pre- and post-trigger sample sizes.Compatible with Digital and Analog trigger modes

Diff. Linearity error ±1.25V range ±3 LSB all other ranges ±1 LSB thregral Linearity error ±1.25V ±3 LSB all other ranges ±1.5 LSB

Gain Error ±1.25V, 0-1.25V 22.5 ppm typ, 45 max all other ranges 22.5ppm max

No missing codes
Gain drift / Zero drift
Input leakage current
Input impedance

16- bits guaranteed
±7ppm/°C / ±2ppm/°C
200 nA (25 Deg C)
10 Megohms, Min

Maximum input voltage ±35V

Counter section

Configuration Single 16-Bit down counters 1/3 82C54
User connections Clock in, Gate and Output all available at

I/O connector

Clock input frequency 10Mhz max High pulse width (clk input) 30ns min Low pulse width (clk input) 50ns min Gate width high or low 50ns min Input low voltage 0.8V max Input high voltage 2.0V min Output low voltage 0.4V max Output high voltage 3.0V min

Analog Output:

Resolution 16-bits

Number of channels 2 (not available on /JR version)
Voltage Ranges ±10V, ±5V, 0-5V, 0-10V. Each channel

independently programmable

D/A update rate 100 kHz on each D/A operating in

single channel or simultaneous update mode via 16384 sample FIFO and Bus Master

Data transfer modes

or through programmed I/O.

Arbitrary waveform mode Supports repetitive waveforms to 16 ksample

D/A pacing

Internal or external clock or software paced

D/A trigger modes Software or external gate.

Offset error ±100uV max, all ranges

Gain error ±30.5ppm max
Differential nonlinearity ±1LSB max
Monotonicity 16-bits at 25 °C
D/A Gain drift ±15 ppm/°C max
D/A Bipolar offset drift ±5 ppm/°C max
D/A Unipolar offset drift ±3 ppm/°C max

Throughput 100kHz, 2 channels simultaneous.

Settling time (20V step to .0008%) $13 \mu s max$ Settling time (10V step to .0008%) $6\mu s typ$

Slew Rate 10V Ranges 6 V/uS 5V Ranges 3 V/uS

Current Drive ±5 mA min
Short-circuit current ± 35 mA indefinite
Output Coupling / impedance DC / 0.1 ohms max

Miscellaneous Power up/reset, all DAC's set to 0 volts

Digital Input / Output

Digital Bits 32

Configuration 24-bit, 82C55 at Aux 40-pin connector

4 dedicated input & 4 dedicated output bits

on 100-pin main connector

82C55 Specifications

Default/Reset State

Configuration 2 banks of 8, 2 banks of 4, programmable by

bank as input or output Input, High Impedance 2.4 volts @ -2.5 mA min

Output High 2.4 volts @ -2.5 mA min
Output Low 0.5 volts @ 2.5 mA min
Input High 2.0 volts min, 7 volts absolute max

Input High 2.0 volts min, 7 volts absolute max
Input Low 0.8 volts max, -0.5 volts absolute min

Dedicated I/O bits (4 input, 4 output)
Input / Output device: 74LS175

Default/Reset State All 4 outputs to logic low
Output High 2.4 volts @ -0.4 mA min
Output Low 0.5 volts @ 8.0 mA min

Input High 2.0 volts min, 7 volts absolute max Input Low 0.8 volts max, -0.5 volts absolute min

Interrupts INTA# - mapped to IRQn via cPCI BIOS at

boot-time

Interrupt enable Software programmable

Interrupt sources External (rising TTL edge event) or a variety

of internal FIFO status sources

Power consumption

+5V Operating 2.7A typical, 3.1A max

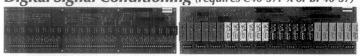
Environmental

Operating temperature range 0 to 70°C
Storage temperature range -40 to 100°C

Humidity 0 to 90% non-condensing

Signal Conditioning & Accessories

Digital Signal Conditioning (requires C40-37F-X or BP40-37)



CIO-ERB08* 8 channel relay rack with 6 Amp, Form C relays 24 channel relay rack with 6 Amp, Form C relays 24 channel relay rack with 10 Amp, socketed and field replaceable Form C relays.

SSR-RACK08* 8 channel solid state I/O module rack. SSR-RACK24* 24 channel solid state I/O module rack.

BNC Connector Interface Boxes



BNC-16SE BNC interface box for single-ended mode. Four are

required to connect all 64 channels.

BNC-16DI BNC interface box for differential mode. Four are

required to connect to all 32 channels.

Screw Terminal Accessory Boards and Boxes SCB-Series & CIO-MINI-Series



The main 100-pin connector is compatible with C100FF-03 series cables and the SCB-50 screw connection box (1 required for all 100 connections) or CIO-MINI50 screw terminal board (2 required).

The auxilliary digital connector is compatible with the SCB-37 using C40-37F-X series cables or the CIO-MINI40 using C40FF-X series cables.

* Items denoted with an asterisk are available with detachable screw terminals.

Auto-Calibration / Self-Calibration

In keeping with general plug-and-play standards, the CPCI-DAS6402/16 board has no switches, jumpers or potentiometers. *Auto-calibration* is performed with digital potentiometers and/or trim D/A converters. Unlike some boards that use software lookup tables for post-acquisition error correction, the CPCI-DAS6402/16 board's data is accurate when written into your computer's memory. The calibration factors that control the digital trim components are stored in EEPROM on the board. You can remove the board from one computer, install it in another, and it will still provide calibrated data.

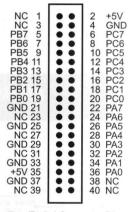
In addition to being auto-calibrating, the CPCI-DAS6402/16 board is self calibrating. The CPCI-DAS6402/16 provides on-board circuitry that grounds the inputs for offset calibration, and connects the inputs to an ultra-stable, on-board voltage reference for gain calibration. A complete calibration is as simple as issuing a single software command.

For a complete discussion of ComputerBoards unique and powerful auto-calibration and self-calibration techniques, please refer to our Auto- and Self-Calibration tutorial on page 270.

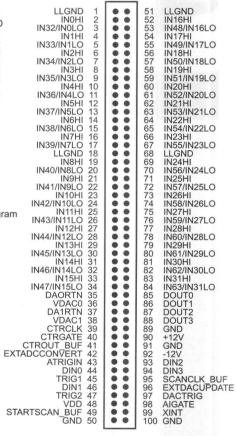
I/O Connector & Cables

All analog, triggering and counter/timer connections are through a 100-pin connector. The C100FF-XX series cable splits the 100 pins into separate 50-pin cables. The first 50-pin cable contains the signals from pins 1-50, while the second carries pins 51-100. These 50-pin connectors are compatible with the SCB-50 screw connection box (one required), the CIO-MINI50 screw terminal board (two required), and the BNC-16 series (one required for each 16 SE or 8 DIFF channels).

The 24-bits of high current digital I/O are available on an 40 pin header. From the 40-pin header the user connect to the optional BP40-37 which brings these pins out to the standard 37-pin connector and installs in any unused slot. This 37-pin connector is then pin compatible with all DIO24 series boards (and all of our 8 and 24-bit digital signal conditioning boards). Alternatively, the 40-pin header may be brought out directly with the C40FF-2 cable and connected directly to a CIO-MINI40 screw terminal board.



Auxiliary/Digital Connector Diagram



MAIN CONNECTOR

Ordering Guide

CPCI-DAS6402/16

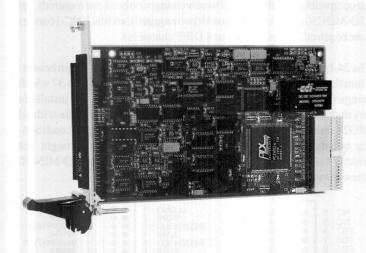
64-channel, 200 kHz, 16-bit analog & digital I/O board for PCI-bus computers.

CPCI-DAS6402/16/JR

64-channel, 200 kHz, 16-bit A/D & digital I/O board for PCI-bus computers.

CPCI-DAS1200 & CPCI-DAS1200/JR

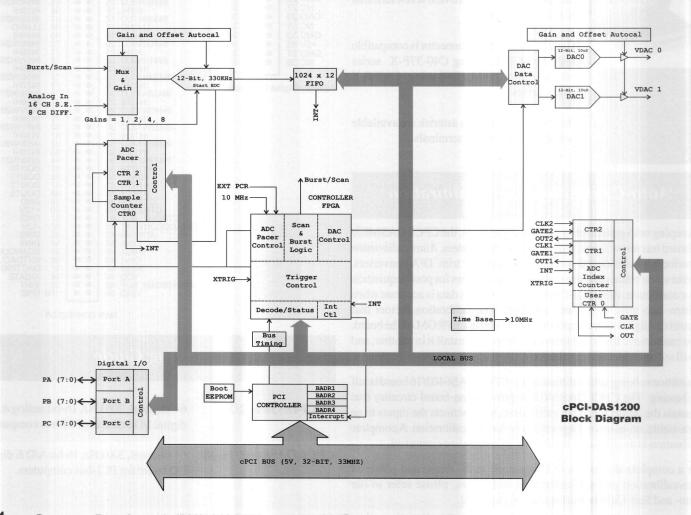
High-Speed CompactPCI-bus Compatible, 16-Channel Analog Input Board with Dual Analog Output Channels & 24 Digital I/O bits



Features

- 16 channel SE / 8 channel diff.
- 12-bit A/D resolution
- 330-kHz sample rate
- Burst-Mode SS&H emulation
- 1024 sample FIFO
- Dual 12-bit D/As (no D/As on /JR model)
- Three 16-bit counters
- 24-bits digital I/O
- Fully Plug-and-Play
- Fully Autocalibrating

Block Diagram



The CPCI-DAS1200 and CPCI-DAS1200/JR multifunction analog and digital I/O boards provide a high performance and low cost solution in CompactPCI-bus data acquisition applications. Offering 16 single-ended or 8 differential 12-bit analog inputs with sample rates up to 330 kHz, 24 bits of digital I/O, three 16-bit down counters. In addition, the CPCI-DAS1200 offers two 12-bit analog outputs. The CPCI-DAS1200/JR is identical to the CPCI-DAS1200 except that it does not provide the analog output channels.

The CPCI-DAS1200 is completely plug-and-play. There are no switches, jumpers or potentiometers on the board. All board addresses, interrupt channels etc. are set by your computer's plug-and-play software. Even calibration is performed via software by using on-board digital potentiometers and trim D/A converters. (For more details on our digital calibration techniques, please see our calibration tutorial on page 270).

Analog Inputs

The CPCI-DAS1200 provides 8 fully differential or 16 single-ended analog inputs. The input mode is software selectable, with no switches or jumpers to set. The board offers a 330 kHz maximum sample rate in single and multichannel scans at any gain setting. A 1024 sample FIFO assures data taken from the board is transferred into computer memory without the possibility of missed samples.

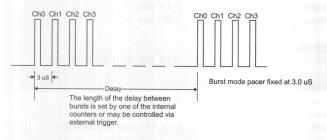
Software also selects the bipolar/unipolar input configuration as well as selecting among the input ranges. The table below details the input ranges and resolutions for the available input configurations and gains.

Bipolar		Unipolar	•
Range	Resolution	Range	Resolution
±10V	4.88mV	0-10V	2.44mV
±5V	2.44mV	0-5V	1.22mV
±2.5V	1.22mV	0-2.5V	0.61 mV
±1.25V	0.61mV	0-1.25V	305 uV

Burst Mode

Channel-to-channel skew is the result of multiplexing the A/D inputs and is defined as the time between consecutive samples. For example, if four channels are sampled at a rate of 1 kHz per channel, the channel skew is $250 \,\mu s$ (1 ms/4).

Burst mode minimizes channel-to-channel skew by clocking the A/D at the maximum rate between successive channels. For example, at the 1-ms pulse channel 0 is sampled, channel 1 is sampled 3 μ s later, channel 2, 3 μ s after that, and channel 3, 3 μ s after that. Then no samples are taken until the next 1-ms pulse, when channel 0 is sampled again. In this mode the rate for all channels is 1 kHz, but the channel-to-channel skew (delay) is now 3 μ s, or 9 μ s total. The minimum burst mode skew/delay on the CPCI-DAS1200 is 3 us.



Burst Mode Timing Diagram

Analog Outputs

The CPCI-DAS1200 provides two channels of 12-bit analog output. Software selectable output ranges of 0-10V, 0-5V, \pm 10V and \pm 5V are provided, and channels may be set at different ranges. The D/A outputs provide rated accuracy to \pm 5 mA, are short circuit protected (25 mA limit) and are cleared to 0 volts on power up or reset. The analog outputs are controlled via programmed I/O commands.

Parallel Digital I/O

The CPCI-DAS 1200 and CPCI-DAS 1200/JR provide 24 bits of parallel, digital I/O in the form of two 8-bit ports, and two 4-bit ports. This digital capability is based on an on-board 82C55 PIA chip, which allows each of the ports to be set independently as input or output. On power up or reset, the ports default to the input state (high impedance).

Counter/Timer I/O

The CPCI-DAS1200 and CPCI-DAS1200/JR provide three 16-bit down counters. The counters are based on an 82C54 chip, which provides clock, gate and output connections for each counter. The CTR4 clock may be connected to the on-board 10 MHz xtal oscillator or may be left uncommitted for user input.

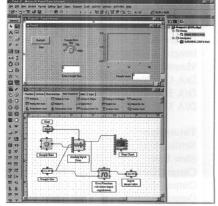
Installed in any CompactPCI-bus compatible personal computer the CPCI-DAS1200 turns your personal computer into a high speed data acquisition and control station suitable for laboratory data collection, instrumentation, production test, or industrial monitoring.

Software

All CPCI-DAS1200 boards come complete with ComputerBoards' powerful *Insta*CalTM software package. *Insta*Cal is a complete installation, calibration and test program for ComputerBoards data acquisition and control boards. Complete with extensive error checking, *Insta*Cal guides you through installation and setup of your data acquisition board and creates the board configuration file for use by your program or application software package. *Insta*Cal is described in detail within the software section of this handbook.

The CPCI-DAS1200 boards are fully supported by ComputerBoards' powerful Universal Library. Universal Library is a complete set of I/O libraries and drivers for all of our boards, for all Windows based languages. When using the Universal Library you can switch boards or even programming languages and the syntax remains constant. Want to change programming languages? The Universal Library requires no relearning. For details on Universal Library, please refer to the software section of this handbook.

The CPCI-DAS1200 boards are fully supported by a wide variety of applications software packages including SoftWIRE™, DAS-Wizard™, (and DAS-Wizard Pro™), HP VEE®, HP VEE Lab and Lab-VIEW™. For further details on these, as well as a variety of other software packages, please refer to the software section provided earlier in this catalog.



SoftWIRE for Visual Basic combines the simplicity of graphical programming with the power and flexibility of programming in VB!

Premium Quality, Superior Performance and Low Prices.

CPCI-DAS1200 Specifications

Analog input section A/D converter type ADS7800 Resolution 12 bits ±10V, ±5V, ±2.5V, ±1.25V, Programmable ranges 0 - 10V, 0 - 5V, 0 - 2.5V, 0 - 1.25V A/D pacing Programmable: internal counter or external source (A/D External Pacer) or sw polled Software selectable option, rate = 3μ s Burstmode A/D Trigger sources External digital (A/D External Trigger) A/D Triggering Modes Digital: Software enabled, rising edge Unlimited pre- and post-trigger Pre-trigger: samples. Total samples must be > 512. Data transfer mode From 1024 sample FIFO via REPINSW, interrupt or software polled Polarity Unipolar/Bipolar, software selectable Number of channels 8 diff. or 16 SE, software selectable A/D conversion time 330 kHz min Throughput 3.0 uS max (to 0.01% at any gain) Input settling time Relative Accuracy ±1.5 LSB Differential Linearity error ±0.75 LSB Integral Linearity error ±0.5 LSB typ, ±1.5 LSB max Gain Error ± 0.02% of reading Max No missing codes 12 bits (guaranteed) Gain drift (A/D specs) ±6ppm/°C Zero drift (A/D specs) ±1ppm/°C Common Mode Range ±10V CMRR @ 60Hz 70dB Input leakage current 200nA Input impedance 10 megohms min Maximum input voltage ±35V **Analog Output:** AD7847AR D/A type Resolution 12 bits Number of channels Output Ranges ±10V, ±5V, 0-5V, 0-10V. Each channel independently programmable. D/A pacing Software Data transfer Programmed I/O. Offset error ±600µV max, all ranges (calibrated) Gain error ±0.02% FSR max (calibrated) ±1LSB max Differential nonlinearity ±1LSB max Integral nonlinearity Monotonicity 12 bits D/A Gain drift ±2 ppm/°C max D/A Bipolar offset drift ±5 ppm/°C max D/A Unipolar offset drift ±5 ppm/°C max Throughput PC dependent Settling time 4µs typ (to .01% of 10V step) Slew Rate 7V/μS Current Drive ±5 mA min

Output short-circuit duration 25 mA indefinite

DC

0.1 Ohms max

on power up or reset

DAC's cleared to 0 volts, ±200mV

Digital Input / Output

Digital Type 82C55A Configuration 2 banks of 8, 2 banks of 4, programmable by bank as input or output Number of channels Logic Levels Output High 3.0 volts @ -2.5mA min Output Low 0.4 volts @ 2.5 mA max Input High 2.0 volts min, Vcc+0.5 volts abs max Input Low 0.8 volts max, GND-0.5 volts abs min Power-up / reset state Input mode (high impedance) Interrupts INTA# - mapped to IRQn via cPCI BIOS Interrupt enable Programmable Interrupt sources Residual counter, End-of-channel-scan, AD-FIFO-not-empty, AD-FIFO-half-full Counter section Configuration Two 82C54s with three 16-bit down counters per 82C54 Counter 0 - ADC residual sample counter Source: ADC Clock Gate: Internal programmable sourc. Output: End-of-Acquisition interrupt Counter 1 - ADC Pacer Lower Divider Source: 10 MHz oscillator Gate: Tied to Counter 2 gate, programmable source Output: Chained to Counter 2 Clock. Counter 2 - ADC Pacer Upper Divider Source: Counter 1 Output Tied to Counter 1 gate, programmable source. Gate: ADC Pacer clock (if software selected), Output: available at user connector 82C54B: Counter 0 - Pretrigger Mode Source: ADC Clock. Gate: External trigger End-of-Acquisition interrupt. Output: Counter 0 - User Counter 4 (when in non-Pretrigger Mode) Source: User input at 100pin connector (CLK4) or internal 10MHz (software selectable) Gate: User input at 100pin connector (GATE4) Available at 100pin connector (OUT4) Output: Counter 1 - User Counter 5 Source: User input at 100pin connector (CLK5) Gate: User input at 100pin connector (GATE5) Available at 100pin connector (OUT5) Output: Counter 2 - User Counter 6 Source: User input at 100pin connector (CLK6) Gate: User input at 100pin connector (GATE6) Output: Available at 100pin connector (OUT6) Clock input frequency 10Mhz max High pulse width (clk input) 30ns min Low pulse width (clk input) 50ns min Gate width high or low 50ns min Input low voltage 0.8V max Input high voltage 2.0V min Output low voltage 0.4V max Output high voltage 3.0V min Power consumption +5V Operating 0.8A typical, 1.0A max **Environmental** Operating temp range 0 to 70°C Storage temp range -40 to 100°C Humidity 0 to 90% non-condensing

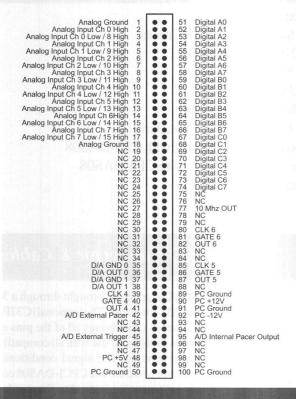
Output Coupling

Miscellaneous

Amp Output Impedance

I/O Connector & Cables

All I/O signals are brought through a 100-pin high-density connector. The (optional) C100FF-XX series cable splits the 100 pins into two separate 50-pin cables. The first 50-pin cable contains the signals from pins 1-50, while the second carries pins 51-100 and keeps the analog signals in one cable and the digital in another. This configuration minimizes noise in the analog signal lines and greatly simplifies field wiring as well as connections to external signal conditioning products.



Auto-Calibration / Self-Calibration

In keeping with general plug-and-play standards, the CPCI-DAS1200 boards have no switches, jumpers or potentiometers. *Auto-calibration* is performed with digital potentiometers and/or trim D/A converters. Unlike some boards that use software lookup tables for post-acquisition error correction, the PCI-DAS1200 boards' data is accurate when written into your computer's memory.

The calibration factors that control the digital trim components are stored in EEROM on the board. You can remove the board from one computer, install it in another, and it will still provide calibrated data.

In addition to being auto-calibrating, the CPCI-DAS1200 boards are also self-calibrating. Standard calibration techniques require a channel to be calibrated with zero volts input (offset calibration) and with a known input voltage (gain calibration). The CPCI-DAS1200 provides on-board circuitry that will short the inputs allowing offset calibration, and then connect the inputs to an ultra-stable, on-board voltage reference for the gain calibration. A complete CPCI-DAS1200 calibration is as simple as issuing a single software command.

For a complete discussion of ComputerBoards unique and powerful auto-calibration and self-calibration techniques, please refer to our Auto- and Self-Calibration tutorial on page 270.

Signal Conditioning & Accessories

Analog Signal Conditioning





ISO-RACK16/P* 16-channel ISO-5B module rack connects an ISO-5B

module to each analog input channel.

ISO-DA02/P* 2-channel ISO-5B module rack connects a ISO-5B

module to each analog output channel.

Digital Signal Conditioning (requires DADP-5037 adaptor)





CIO-ERB24* CIO-SERB24* 24 channel relay rack with 6 Amp, Form C relays 24 channel relay rack with 10 Amp, socketed and field

replaceable Form Crelays.

SSR-RACK24* 24 channel solid state I/O module rack.

BNC Connector Interface Boxes



BNC-16SE BNC interface box for 16 channel single-ended mode.

Brings each channel out to a BNC connector.

BNC-16DI BNC interface box for 8 channel differential mode.

 $Each \, channel \, has \, a \, separate + and - BNC \, connector.$

Screw Terminal Accessory Boards and Boxes



SCB-Series & CIO-MINI-Series

The main 100-pin connector is compatible with C100FF-03 series cables and the SCB-50 screw connection box (1 required for all 100 connections) or CIO-MINI50 screw terminal board (2 required).

* Items denoted with an asterisk are available with detachable screw terminals. These terminals simplify field wiring and board replacements. To specify detachable screw terminals simply add a /DST suffix to the part number (e.g. CIO-MINI50/DST or CIO-ERB24/DST).



Ordering Guide

CPCI-DAS1200

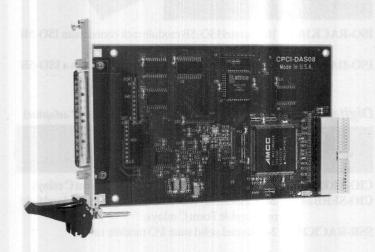
16-channel, 330kHz, 12-bit A/D, D/A & digital I/O board for cPCI-bus computers.

CPCI-DAS1200/JR

16-channel, 330kHz, 12-bit A/D & digital I/O board for cPCI-bus computers.

CPCI-DAS08

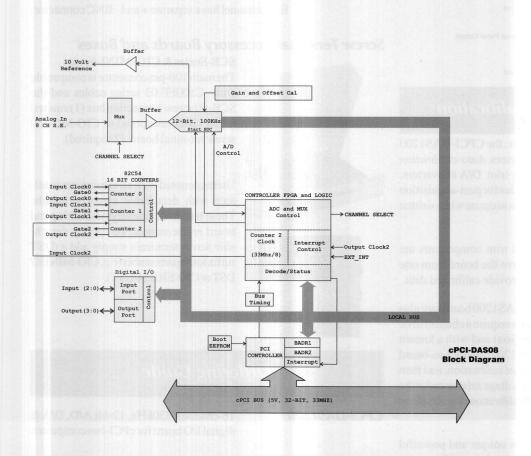
Low Cost, CompactPCI-bus Compatible, 8-Channel Analog Input Board with 7 Digital I/O Bits and Three 16-bit Counters



Features

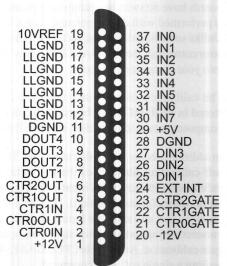
- · Extremely low cost
- 8 Single ended analog inputs
- 12-bit A/D resolution
- ± 5 volt input range
- 50 kHz sample rate
- Three 16-bit counters
- 7-bits digital I/O (4 out, 3 in)
- Connector compatible with CIO-DAS08
- Register compatible with CIO-DAS08
- Fully plug-and-play

Block Diagram



I/O Connector & Cables

All I/O signals are brought through a 37-pin "D" connector. The (optional) C37FF-XX series cable brings all of the pins out and is suitable for use with all compatible screw terminal and signal conditioning accessory boards. The CPCI-DAS08 connector pinout is identical to the standard ISA bus CIO-DAS08 and is fully compatible with the same wide assortment of signal conditioning accessory boards.



Functional Description

The CPCI-DAS08 is a low-cost analog input board for CompactPCI bus compatible computers. Offering 8 single-ended 12-bit analog inputs with sample rates up to 50 kHz and A/D resolution of 2.44 mV. The board also provides 4 digital output bits, 3 digital input bits, and three 16-bit down counters (in the form of a single 82C54). The CPCI-DAS08 is connector and software compatible with ComputerBoards highly popular ISA-based CIO-DAS08 board and is supported by the same wide variety of external signal conditioning products.

The CPCI-DAS08 is completely plug-and-play. There are no switches, jumpers or potentiometers on the board. All board addresses, interrupt channels etc. are set by your computers plug-and-play software.

CPCI-DAS08 Specifications

Analog input section

Resolution 12-bits (2.44 mV)

Input ranges ±5\

A/D pacing Software polled
Data transfer Software polled
Number of channels 8 single-ended
A/D conversion time 10µs
Throughput 50kHz min

Throughput 50kHz min Relative Accuracy ±1LSB

Differential Linearity error No Missing Codes guaranteed

Integral Linearity error ±1 LSB
No missing codes guaranteed 12 bits
Gain drift (A/D specs) ±180ppm/°C
Zero drift (A/D specs) ±60ppm/°C

Input leakage current ±60 nA max over temperature

Input impedance 10Meg Ohms min

Absolute max. input voltage ±15V

VREF output +10.00V ±0.1V @ 2 mA max

Digital Input / Output

Configuration
Output / Input chip
Output High
Output Low
Input High

Input High Input Low

Interrupts

Interrupt enable Interrupt sources 3 fixed input, 4 fixed output 74ACT273 / 74LS244 3.94 volts min @ -24mA 0.36 volts max @ 24mA 2.0 volts min, 7 volts absolute max

0.8 volts max, -0.5 volts absolute min INTA# - mapped to IRQn via cPCI

BIOS at boot-time External, Programmable

External

Counter section

Configuration Three 16-bit down counters (82C54) Gate, Clk and Output of counter 0 and 1 are available at connector. Gate and Output of counter 2 are available at connector, CLK 2 is connected to a frequency divider set at PCI bus clock / 8.

Clock input frequency 10Mhz max (30ns min pulse width)
Input low / high 0.8V max / 2.0V min
Output low / high 0.4V max / 3.0V min at ±2.4 mA

Power consumption

+5V Operating 251 mA typical, 436 mA max +12V 13 mA typical, 19 mA max -12V 17 mA typical, 23 mA max

Environmental

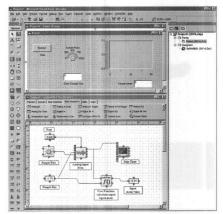
Operating / Storage temp 0 to 50 $^{\circ}$ C / -20 to 70 $^{\circ}$ C Humidity 0 to 90% non-condensing

Software

All PCI-DAS08 series boards come complete with ComputerBoards' powerful *Insta*Cal™ software package. *Insta*Cal is a complete installation, calibration and test program for ComputerBoards data acquisition boards. Complete with extensive error checking, *Insta*Cal guides you through installation and setup of your data acquisition board and creates the board configuration file for use by your program or application software package. *Insta*Cal is described in the software section of this catalog.

The boards are fully supported by ComputerBoards' powerful Universal Library. Universal Library is a complete set of I/O libraries and drivers for all of our boards, for all Windows based languages. When using the Universal Library you can switch boards or even programming languages and the syntax remains constant. Universal Library is fully described in the software section of this handbook.

The CPCI-DAS-08 boards are fully supported by a wide variety of applications software packages including SoftWIRE™,DAS-Wizard™, (and DAS-Wizard Pro™), HP VEE®, HP VEE Lab and Lab-VIEW™. For further details of these, as well as a variety of other software packages, please refer to the software section provided earlier in this catalog.



SoftWIRE for Visual Basic combines the simplicity of graphical programming with the power and flexibility of programming in VB!

Ordering Guide

CPCI-DAS08 Low cost, 8-channel, 12-bit analog input board for PCI-bus computers.

Multiplexers and Thermocouple Input Boards

CIO-EXP32 32 channel, differential input Mux with switch

selectable gains and CJC.

CIO-EXP-16 16 channel, differential input Mux with switch

selectable gains and CJC.

Bridge, RTD & GP Signal Conditioning Input Boards

CIO-EXP-BRIDGE16 16 channel, Wheatstone bridge signal

conditioning board.

CIO-EXP-RTD16 16 channel, RTD signal conditioning

oard.

CIO-EXP-GP 16 channel, general purpose signal

conditioning board.

ISO-5B isolated Input Boards

ISO-RACK08 8 channel, ISO-5B isolation module mounting rack.

Screw Terminal Boards and Boxes

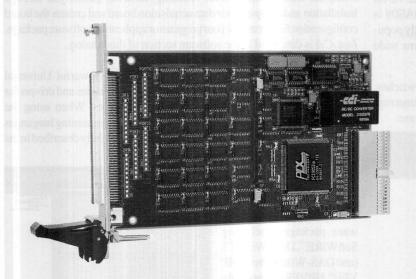
CIO-MINI37 37 terminal, screw terminal board

SCB-37 37 terminal, shielded screw terminal box

Premium Quality, Superior Performance and Low Prices.

CPCI-DDA02/16, 04/16, 08/16

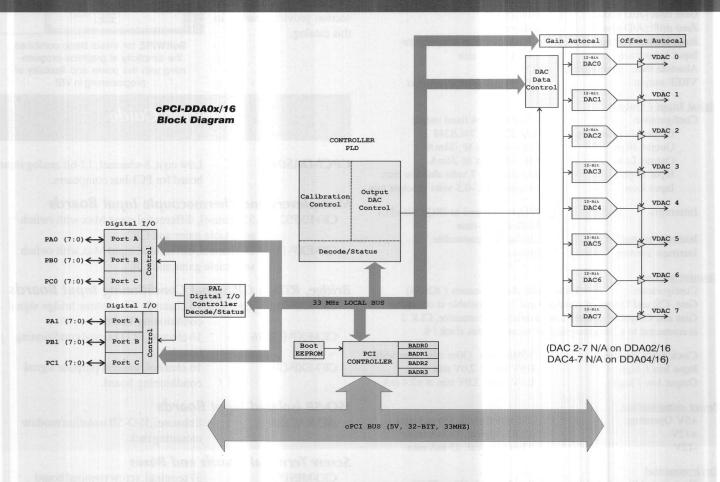
CompactPCI-bus Compatible, 2, 4, & 8-Channel, 16-Bit Analog Output Board with 48 Digital I/O bits



Features

- 2, 4, & 8 channel analog output models
- One D/A per channel
- 16-bit D/A resolution (1 in 65,536)
- 48 bits of high output digital I/O
- High current digital outputs
- Digital I/O section is connector compatible with all ComputerBoards 50-pin based signal conditioning
- Unique *in-system* calibration function allows the removal of wiring IR errors
- Fully Plug-and-Play
- Fully Autocalibrating

Block Diagram



Functional Description

The CPCI-DDA0x/16 multifunction analog output and digital I/O boards set a new standard for high performance, analog output on the CompactPCI-bus. The CPCI-DDA0x/16 family consists of three models with either 2, 4, or 8 output channels and 48 bits of digital I/O. The CPCI-DDA0x/16 analog output channels may be updated independently or simultaneously.

The CPCI-DDA0x/16 is completely plug-and-play. There are no switches, jumpers or potentiometers on the board. All board addresses, interrupt channels, etc. are set by your computer's plug-and-play software. Even calibration is performed via software by using on-board trim D/A converters. A powerful *in-system* calibration capability allows the board to be calibrated after installation, and eliminates connection wire and connector IR errors. (For more details on our digital calibration techniques, please see our calibration tutorial on page 270).

Analog Outputs

The CPCI-DDA0x/16 provides two, four, or eight channels of 16-bit analog output (one part in 65536). Each channel is implemented with an independent D/A converter, and the analog outputs are updated under software control. Software selectable output ranges of 0-10V, 0-5V, 0-2.5V, ±10V, ±5V, and ±2.5V are provided and channels may be set at

I/O Connector & Cables

All I/O signals are brought through a 100-pin high-density connector. The standard C100HD50-X series cable splits the 100 pins into two separate 50-pin cables. The first 50-pin cable contains pins 1-50, while the second carries pins 51-100 keeping the analog signals in one cable and the digital in another. This configuration minimizes noise in the analog signal lines and greatly simplifies field wiring as well as connec-

tions to external signal conditioning products. The C100HD50-X series cable then connects to either the SCB-50 screw connection box (one required) or the CIO-MINI50 (two required).

The C100HDS-X series shielded cable provides greater noise immunity and is compatible with the SCB-100 screw connection box.

Vout 0	512534556578906116634656670717237457677899611663488889091223934456667009100	P2-A7 P2-A6 P2-A6 P2-A7 P2-A7 P2-A8 P2-A8 P2-A8 P2-A8 P2-A8 P2-B1 P2-B1 P2-B1 P2-B5 P2-B3 P2-B2 P2-B1 P2-B3 P2-B2 P2-B1 P1-B1	

Connector Diagram

different ranges. The D/A outputs provide rated accuracy to ±5 mA, are short circuit protected (25 mA limit) and are cleared to 0 volts on power up or reset.

The table below details the input ranges and resolutions for the available input configurations and gains.

Bipolar		Unipolar	
Range	Resolution	Range	Resolution
±10V	$305 \mu V$	0-10V	152.6μV
±5V	152.6μV 0-5V	76.29 µV	
±2.5V	76.29µV 0-2.5V	38.15µV	

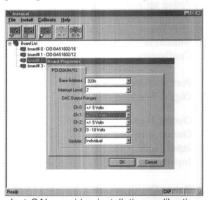
Parallel Digital I/O

The CPCI-DDA0x/16 provide 48 bits of parallel, digital I/O in the form of four 8-bit ports and four 4-bit ports. This digital capability is based on an on-board, high output current emulation of the 82C55 mode 0 and allows each of the ports to be set independently as input or output. On power up or reset, the ports default to the input state (high impedance). The digital I/O section of the board is fully connector compatible with all of ComputerBoards 50-pin digital signal conditioning boards.

Software

All CPCI-DDA0x/16 boards come complete with ComputerBoards' powerful *Insta*CalTM software package. *Insta*Cal is a complete instal-

lation, calibration and test program for Computer-Boards data acquisition and control boards. Complete with extensive error checking, *Insta*Cal guides you through installation and setup of your data acquisition board and creates the board configuration file for use by your program or application software package. *Insta*Cal is described in detail within the software section of this handbook.



InstaCAL provides installation, calibration and test functions for all of our boards!

The CPCI-DDA0x/16 boards are fully supported by ComputerBoards' powerful Universal Library. Universal Library is a complete set of I/O libraries and drivers for all of our boards, in all Windows based languages. When using the Universal Library you can switch boards or even programming languages and the syntax remains constant. For details on Universal Library, please refer to this handbook's software section.

The CPCI-DDA0x/16 boards are fully supported by a wide variety of applications software packages including SoftWIRE $^{\text{\tiny TM}}$, DAS-Wizard $^{\text{\tiny TM}}$, (and DAS-Wizard Pro $^{\text{\tiny TM}}$), HP VEE $^{\text{\tiny SM}}$, HP VEE Lab and LabVIEW $^{\text{\tiny TM}}$. For further details on these, as well as a variety of other software packages, please refer to the software section provided earlier in this catalog.

CPCI-DDA0x/16 Specifications

Analog Output:

D/A convertor type

Resolution

Number of channels Output Ranges

Voltage Output

16-bits

8, 4 or 2 depending on model ±10V, ±5V, ±2.5V, 0 - 10V, 0 - 5V,

0 - 2.5V. Each channel independently

programmable.

Data transfer modes

Programmed I/O.

Offset error Gain error

±1.5 LSB (calibrated) ±1.5 LSB (calibrated)

Differential nonlinearity Integral nonlinearity

±0.5 LSB typ., ±1 LSB max (over temp) ±0.5 LSB typ., ±4 LSB max (over temp)

Monotonicity D/A Gain drift D/A Offset drift

±0.1 ppm/°C ±0.5 ppm/°C

Throughput

PC dependent

Settling time

 $20\mu s$ max (20V step to ± 1.5 LSB) 12 μ s typ (20V step to ± 1.5 LSB)

Slew Rate

2.5 V/µs

Current Drive

Miscellaneous

±5 mA

Output short-circuit duration 25 mA indefinite

Output coupling Output impedance DC 0.011 ohms max

In-system calibration range

In-system calibration can compensate for connector/cable resistance up to 7 ohms

Double buffered output latches

Update DACs individually or simulta-

Power up and reset state

neously (software selectable) all DAC's cleared to 0 volts

Digital Input / Output

Number of channels Configuration

48 I/O

4 banks of 8, 4 banks of 4,

programmable by bank as input or output

Port configurations

Digital Interface chips Output: 74S244 Input: 74LS373

Output High Output Low

2.4 volts @ -15mA min 0.5 volts @ 64 mA min

Dual 8255 mode 0 emulation

Input High 2.0 volts min, 7 volts absolute max Input Low 0.8 volts max, -0.5 volts absolute min

Power On / Reset State

All ports to input mode

Power consumption

CPCI-DDA08/16

+5V Operating

1.8A typical, 2.2A max

+12V -12V

not used not used

CPCI-DDA04/16

+5V Operating

1.6A typical, 2.1A max

+12V -12V

not used not used

CPCI-DDA02/16

+5V Operating

1.4A typical, 2.0A max

+12V -12V

not used not used

Environmental

Operating temp range Storage temp range

0 to 70 °C -40 to 100 °C

Humidity

0 to 90% non-condensing

Auto-Calibration / Self-Calibration

In keeping with general plug-and-play standards, the CPCI-DDA0x/16 boards have no switches, jumpers or potentiometers. Auto-calibration is performed with trim D/A converters.

The calibration factors that control the digital trim components are stored in EEPROM on the board. You can remove the board from one computer, install it in another, and it will still provide calibrated data.

For a complete discussion of ComputerBoards unique and powerful auto-calibration and self-calibration techniques, please refer to our Auto- and Self-Calibration tutorial on page 270.

Signal Conditioning & Accessories

Analog Signal Conditioning







ISO-DA02/P*

2-channel ISO-5B module rack connects a ISO-5B

module to each analog output channel.

ISO-DA04/P*

4-channel ISO-5B module rack connects a ISO-5B

module to each analog output channel.

ISO-DA08/P*

8-channel ISO-5B module rack connects a ISO-5B

module to each analog output channel.

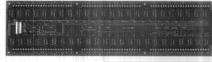
Solid State I/O Modules & Racks



SSR-RACK48* SSR-RACK24* 48 channel solid state I/O module rack. 24 channel solid state I/O module rack.

Electromechanical Relays





CIO-SERB48*

48 channel relay rack with 10 Amp, socketed and field replacable Form C relays.

CIO-ERB48* CIO-ERB24* 48 channel relay rack with 6 Amp, Form C relays. 24 channel relay rack with 6 Amp, Form C relays 24 channel fault detecting relay rack with 10 Amp,

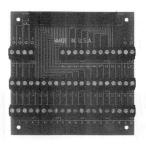
CIO-SERB24* socketed and field replacable Form C relays.

Screw Terminal Boards

Screw Terminal Accessory Boards and Boxes



SCB-Series Screw Connection Box The 100-pin connector is compatible with the C100HD50-X series cable and the SCB-50 (1 required). The C100HDS-X series shielded cable provides maximum noise immunity and is compatible with the SCB-100 screw terminal interface box.



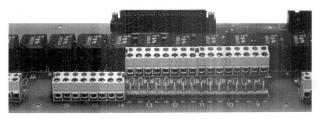
CIO-MINI-50 Screw Terminal Board The 100-pin connector is compatible with the C100HD50-X series cable and the CIO-MINI50 (2 required).

Ordering Guide

CPCI-DDA02/16 2-channel, 16-bitD/A & high-current digital I/O board for PCI-bus computers.

CPCI-DDA04/16 4-channel, 16-bitD/A & high-current digital I/O board for PCI-bus computers.

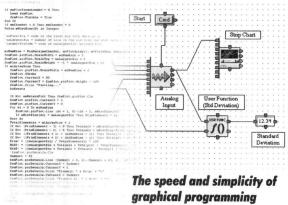
CPCI-DDA08/16 8-channel, 16-bitD/A & high-current digital I/O board for PCI-bus computers.



The CIO-MINI50 is available with detachable screw terminals. These terminals simplify field wiring and board replacements. To specify detachable screw terminals order the CIO-MINI50/DST



The power and flexibility of syntactical programming



Introducing SoftWIRE™

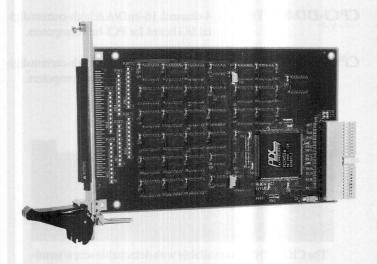
Graphical Programming in Visual Basic®

Syntactical programming has been around since the early days of computers. More recently, graphical programming languages have been introduced and are now a popular alternative to writing hard core, text-based syntax. What's been lacking is an easy way to combine the speed and ease of use of graphical programming with the flexibility and efficiency of writing code in an industry standard language. Until now—Introducing SoftWIRE.

For more information on SoftWIRE, please see pages 6 -10 in this catalog.

CPCI-DIO96H & CPCI-DIO48H

CompactPCI-bus Compatible, 96-Bit and 48-Bit, High Output Current, Logic Level Digital I/O Boards



Features

- 48 or 96 digital I/O bits
- High drive output (64 mA sink, 15 mA source)
- Emulates 8255 mode 0
- Compatible with a wide variety of relay and SSR module racks
- Register compatible with CIO-DIO48H/96H
- Fully plug-and-play

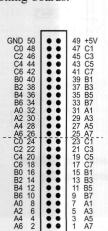
Block Diagram

PA3 (7:0) Port A PC3 (7:0) -The upper 48 bits (Groups 2 & 3) are not available on HIGH DRIVE the PCI-DIO48H PA2 (7:0) Port A PB2 (7:0) 4 Port B HIGH DRIVE CONTROLLER FPGA and LOGIC PA1 (7:0) Port A PC1 (7:0) ← code/Status HIGH DRIVE PA0 (7:0) PC0 (7:0) -Port C cPCI-DIO96H **Block Diagram** cPCI BUS (5V, 32-BIT, 33MHZ)

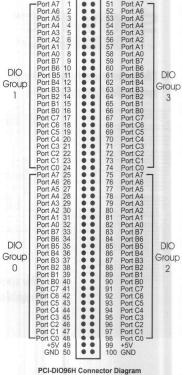
I/O Connector & Cables

All CPCI-DIO96H I/O signals are brought through a 100-pin high-density connector. The C100FF-XX series cable splits the 100 pins into two separate 50-pin cables. The first 50-pin cable contains the signals from pins 1-50, (groups 0 & 1), while the second carries pins 51-100, (groups 2 & 3). These 50-pin cables are fully compatible with the SCB-50 and CIO-MINI50 screw terminal boxes/boards as well as all ComputerBoards 50-pin relay and solid state I/O module racks. The

PCI-DIO48H signals are brought out through a 50pin connector. The C50FF-XX cable connects the board to the SCB-50, CIO-MINI50 or any of our 50-pin compatible digital signal conditioning boards.



PCI-DIO48H Connector Diagram



Functional Description

The PCI-DIO96H and PCI-DIO48H are high density, logic level, digital I/O boards for PCI bus compatible computers. The PCI-DIO96H offers 96 bits of digital I/O while the PCI-DIO48H has 48. Both boards the I/O in 24-bit *groups* based on an 82C55, mode 0 emulation. Each group provides an 8-bit port A and port B, as well as an 8-bit port C that can be split into independent 4-bit port C-HI and a 4-bit port C-LO.

The digital outputs drivers are 74S244 chips and provide 64 mA sink and 15 mA source current capabilities. The input buffers are 74LS373 and offer the high standard input impedance of the 74LS series. On power up and reset, all I/O bits are set to input mode. Like all members of the 74LS series, unconnected inputs will typically float high. If you are using the board to control items that must be *OFF* on reset, you will need to install pull-down resistors. Provisions have been made on the board to allow users to quickly and easily install SIP resistor networks in either pull-up or pull-down configurations.

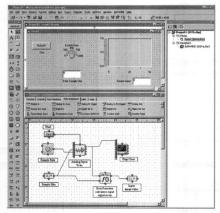
The PCI-DIO48H and PCI-DIO96H are completely plug-and-play. There are no switches or jumpers on the board. All board addresses are set by your computer's plug-and-play software.

Software

All PCI-DIO96H and PCI-DIO48H series boards come complete with ComputerBoards' powerful *Insta*CalTM software package. *Insta*Cal is a complete installation, calibration and test program for ComputerBoards data acquisition boards. Complete with extensive error checking, *Insta*Cal guides you through installation and setup of your data

acquisition board and creates the board configuration file for use by your program or application software package. *Insta*Cal is described in the software section of this handbook.

The boards are fully supported by ComputerBoards' powerful Universal Library. Universal Library is a complete set of I/O libraries and drivers for all of our boards, for all Windows based languages. When using the Universal Library you can switch boards or even pro-



SoftWIRE for Visual Basic combines the simplicity of graphical programming with the power and flexibility of programming in VB!

gramming languages and the syntax remains constant. Universal Library is fully described in the software section of this handbook.

The CPCI-DIO96H and CPCI-DIO48H boards are fully supported by a wide variety of applications software packages including SoftWIRE $^{\text{\tiny{TM}}}$, DAS-Wizard $^{\text{\tiny{TM}}}$, (and DAS-Wizard Pro $^{\text{\tiny{TM}}}$), HP VEE $^{\text{\tiny{SM}}}$, HP VEE Lab and LabVIEW $^{\text{\tiny{TM}}}$. For further details on these, as well as a variety of other software packages, please refer to the software section provided earlier in this catalog.

Specifications

Digital Input / Output

CPCI-DIO48H Config CPCI-DIO96H Config 48 I/O bits: 2 banks of 8, 2 banks of 4, programmable by bank as input or output 96 I/O bits: 8 banks of 8, 8 banks of 4, programmable by bank as input or output

Port configurations Digital Interface chips Dual 8255 mode 0 emulation Output: 74S244 Input: 74LS373

Output High Output Low Input High Input Low

2.4 volts @ -15mA min 0.5 volts @ 64 mA min 2.0 volts min, 7 volts absol

Input Low Power On / Reset State 2.0 volts min, 7 volts absolute max 0.8 volts max, -0.5 volts absolute min

All ports to input mode

Power consumption

CPCI-DIO48H +5V: 1.2 A typical, 1.6 A max CPCI-DIO96H +5V: 2.2 A typical, 3.35 A max

Environmental

Operating temperature Storage temperature Humidity 0 to 70°C -40 to 100°C

0 to 90% non-condensing

Ordering Guide

CPCI-DIO96H

96-bit, high current, logic level digital I/O board for PCI bus computers.

CPCI-DIO48H

48-bit, high current, logic level digital I/O board for PCI bus computers.



Solid State I/O Module Racks

SSR-RACK48 48-bit solid state I/O module rack SSR-RACK24 24-bit solid state I/O module rack



Electromechanical Relay Boards

CIO-ERB48 48 relay, 6 Amp, Form C relay board CIO-SERB48 48 relay, 10 Amp, Form C relay board

with field replacable relays

CIO-ERB24 24 relay, 6 Amp, Form C relay board CIO-SERB24 24 relay, 10 Amp, fault detecting, Form C relay board w/ field replacable relays

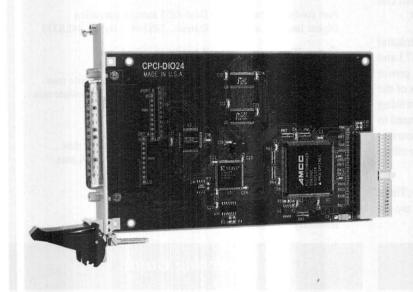
Screw Terminal Boxes and Boards

The CPCI-DIO48H is compatible with the SCB-50 and the CIO-MINI50 screw terminal box/board via the C50FF-2 cable. The CPCI-DIO96H utilizes the C100FF-2 cable as an interface to the SCB-50 (one required) or CIO-MINI50 (two required).



CPCI-DIO24H & CPCI-DIO24

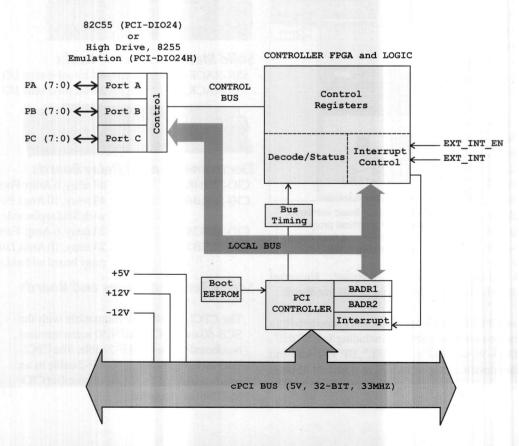
24-Bit CompactPCI-bus Compatible, Logic Level Digital I/O Boards



Features

- 24 digital I/O bits
- CPCI-DIO24 provides direct connections to an 82C55
- CPCI-DIO24H provides high current 82C55 mode 0 emulation (64 mA sink, 15 mA source)
- Compatible with a wide variety of Relay and SSR module racks
- Register compatible with the CIO-DIO24H and CIO-DIO24
- Connector compatible with the CIO-DIO24H and CIO-DIO24

Block Diagram



Functional Description

The CPCI-DIO24 and CPCI-DIO24H are low cost, 24-bit, logic level digital I/O boards for CompactPCI-bus compatible computers. The CPCI-DIO24 is based on the industry standard 82C55 chip, and the 82C55 I/O pins are brought directly to the board's I/O connector. The 82C55 is a powerful 24 bit chip and functions as two 8-bit ports, (Ports A and B) and a third 8-bit port (Port C) that may be further divided into two 4-bit ports (Port C-HI and C-LO). The CMOS outputs of the 82C55 are suitable for driving a wide array of logic devices, though the chips $\pm 2.5~\text{mA}$ drive capability may not be enough in some applications.

The CPCI-DIO24H board provides a discrete logic emulation of the 82C55 mode 0, but offers significantly higher output drive capability (64 mA sink, 15 mA source). This mode 0 emulation is fully compatible with the 82C55, and code written for 82C55 mode based boards will function perfectly on the CPCI-DIO24H.

The CPCI-DIO24(H) boards are connector and software compatible with ComputerBoards highly popular ISA based CIO-DIO24 board as well as a host of other 8255 based boards from other vendors. The boards are also supported by the same wide variety of external relay and solid state I/O module racks as the CIO-DIO24 boards.

The CPCI-DIO24 is completely plug-and-play. There are no switches, or jumpers on the board. All board addresses, interrupt channels etc. are set by your computers plug-and-play software.

I/O Connector & Cables

All I/O signals are brought through a 37-pin "D" connector. The (optional) C37FF-XX series cable brings all of the pins out and is suitable for use with all compatible screw terminal and signal conditioning accessory boards. The CPCI-DIO24 and CPCI-DIO24H connector pinout is identical to the standard ISA bus CIO-DIO24 boards and is fully compatible with the same wide assortment of signal conditioning accessory boards.

37 Port A0 Port A1 GND 35 34 33 32 Port A2 16 Port A3 **GND** 15 14 13 12 11 10 9 8 7 Port A4 -12V Port A5 31 Port A6 30 Port A7 **GND** No Connect GND Port C0 PortB0 Port C1 PortB1 Port C2 Port C3 PortB2 PortB3 25 Port C4 24 Port C5 23 Port C6 22 Port C7 21 GND 654321 PortB5 PortB6 PortB7 IRQ Enable 20 +5V IRQ Input

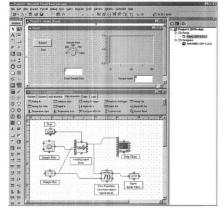
Software

All PCI-DIO24 and PCI-DIO24H boards come complete with Computer-Boards' powerful *Insta* CalTM software package. *Insta* Cal is a complete installation, calibration and test program for ComputerBoards data acquisition boards. Complete with extensive error checking, *Insta* Cal guides you through installation and setup of your data acquisition board and creates the board configuration file for use by your program or application software package. *Insta* CAL is described in the software section of this handbook.

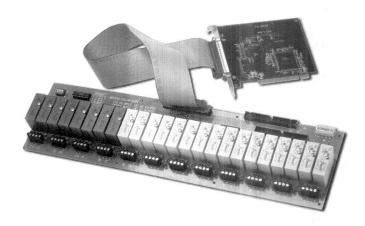
The boards are fully supported by ComputerBoards' powerful Universal Library. Universal Library is a complete set of I/O libraries and drivers for all of our boards, for all Windows based languages. When using the Universal Library you can switch boards or even programming languages and the syntax remains constant. Universal Library is fully

described in the software section of this handbook.

The PCI-DIO24 boards are also fully supported by a wide variety of applications software packages including SoftWIRE™, DAS-Wizard™, (and DAS-Wizard Pro™), HP VEE®, HP VEE Lab and LabVIEW™. For further details on these, as well as a variety of other software packages, please refer to the software section provided earlier in this catalog.



SoftWIRE for Visual Basic combines the simplicity of graphical programming with the power and flexibility of programming in VB!



Combine a CPCI-DIO24, SSR-RACK24, C37FF-2 cable and your CompactPCI bus computer to create a powerful, low-cost digital monitoring and control station!

CPCI-DIO24 (&24H) Specifications

CPCI-DIO24

Digital Input / Output

Configuration 2 banks of 8, 2 banks of 4, programmable by

bank as input or output

I/O device type 82C55 Number of channels 24 I/O

Output High 3.7 volts min @ -2.5mA Output Low 0.4 volts max @ 2.5mA

Input High 2.2 volts min, VCC + .3 volts absolute max Input Low 0.8 volts max, -0.3 volts absolute min

Power-up / reset state Input mode (high impedance)

Interrupts INTA# - mapped to IRQn via cPCI BIOS at

boot-tin

Interrupt enable External (IR ENABLE, active low,

programmable through PCI9050-1; 0 = disabled, 1 = enabled (default)

Interrupt sources External source (IR INPUT), polarity programmable through PCI9050-1; 1 = active high, 0 = active low (default)

Power consumption

+5 V Operating 240 typical, 350 max

+12, -12 not used, but supplied to I/O connector

Environmental

Operating temperature 0 to 50 °C Storage temperature -20 to 70 °C

Humidity 0 to 90% non-condensing

CPCI-DIO24H

Digital Input / Output

Configuration 2 banks of 8, 2 banks of 4, programmable by

bank as input or output

I/O Device Type TTL based 8255 mode 0 emulation

Output: 74S244 Input: 74LS373

Input: Number of channels 24 I/O

Output High 2.4 volts min @ -15mA Output Low 0.5 volts max @ 64 mA

Input High 2.0 volts min, 7 volts absolute max Input Low 0.8 volts max, -0.5 volts absolute min

Interrupts INTA# - mapped to IRQn via cPCI BIOS at

boot-time

Interrupt enable External (IR ENABLE, active low,

programmable through PCI9050-1; 0 = disabled, 1 = enabled (default)

Interrupt sources External source (IR INPUT), polarity programmable through PCI9050-1; 1 = active high, 0 = active low (default)

Power consumption

+5V Operating 625 mA typical, 960 mA max +12, -12 not used, but supplied to I/O connector

Environmental

Operating temperature 0 to 50 °C Storage temperature -20 to 70 °C

Humidity 0 to 90% non-condensing

Signal Conditioning & Accessories

Solid State I/O Modules (see pages 176-178)



SSR-RACK08* SSR-RACK24*

DR-Series

8 channel solid state I/O module rack. 24 channel solid state I/O module rack. Single point, DIN rail mountable Solid State

I/O modules.

Electromechanical Relays (see pages 174-175)





CIO-ERB08* CIO-SERB08* 8 channel relay rack with 6 Amp, Form C relays 8 channel relay rack with 10 Amp, socketed and field

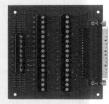
replacable Form Crelays.

CIO-ERB24* CIO-SERB24* 24 channel relay rack with 6 Amp, Form C relays 24 channel relay rack with 10 Amp, socketed and field replacable Form C relays.

Screw Terminal Accessory Boards & Cables



SCB-37 Screw Connection Box 37 terminal shielded screw terminal box. Requires C37FF-X series cable



CIO-MINI-37

37 terminal shielded screw terminal box. Requires C37FF-X series cable.

* Items denoted with an asterisk are available with detachable screw terminals. These terminals simplify field wiring and board replacements. To specify detachable screw terminals add a /DST suffix to the part number (e.g., CIO-MINI37/DST or CIO-ERB24/DST).

Ordering Guide

CPCI-DIO24

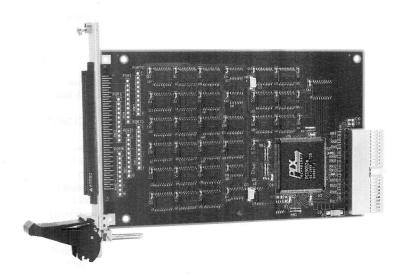
24-bit, low cost, logic level digital I/O board for cPCI-bus computers.

CPCI-DIO24H

24-bit, high current, logic level digital I/O board for cPCI-bus computers.

CPCI-DIO48H/CTR15

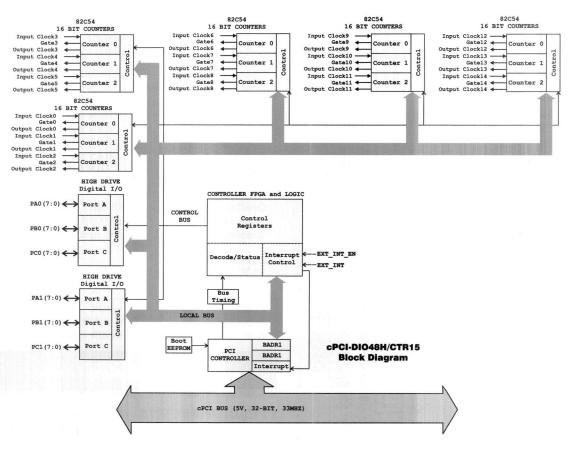
Multifunction, CompactPCI-bus Compatible, Digital I/O Board with Both Parallel Digital I/O and Counter/Timers



Features

- 48 high current digital I/O bits
- Fifteen 16-bit counters
- Compatible with a wide variety of Relay and SSR module racks
- Low cost
- · High density
- On-board provisions for the installation of pull-up or pull-down resistor networks
- Fully Plug-and-Play

Block Diagram



Functional Description

The CPCI-DIO48H/CTR15 is a multifunction, logic level, digital I/O board for CompactPCI bus compatible computers. The board provides 48-bits of high current, parallel digital I/O and fifteen 16-bit counters.

The parallel digital I/O is provided in 24-bit *groups* based on an 82C55, mode 0 emulation. Each group provides an 8-bit port A and port B, and an 8-bit port C that can be split into independant 4-bit ports C-HI and C-LO. The 74S244 digital output drivers provide 64 mA sink and 15 mA source current capabilities. On power up and reset, all I/O bits are set to input mode. Like all members of the 74LS series, unconnected inputs will typically float high. If you are using the board to control items that must be *OFF* on reset, you will need to install pull down resistors. Provisions have been made on the board to allow users to quickly and easily install SIP resistor networks in either pull-up or pull-down configurations.

The counter/timer functionality of the board is based on the 82C54, which provides three 16-bit down counters. The counter section provides access to the gate, clock and counter output of all three counters. The CPCI-DIO48H/CTR15 provides 15 counters (three 82C54s). The board also provides a high-stability, 10-MHz crystal controlled oscillator that may be connected to one or more of the counter inputs.

The board is completely plug-and-play and there are no switches or jumpers that you must set. All board addresses, interrupt levels, etc. are set by your computer's plug-and-play software.

I/O Connector & Cables

All I/O signals of the CPCI-DIO48H/CTR15 are brought out through a 100-pin connector. The C100FF-XX cable splits the 100 pin connector into two 50-pin cables that are compatible with the SCB-50 screw connection box (requires one), the CIO-MINI50 (requires two) as well as a large variety of our 50-pin compatible digital signal conditioning boards.

CPCI-DIO48H/CTR15

Port A7 B 1 2 Port A6 B 1 2 Port A6 B 1 2 Port A6 B 1 2 Port A2 B 1 Port A6 B 1 2 Port A7 B 1 Port A6	51 CTR:CLK 52 CTR:GATE 53 CTR:GATE 53 CTR:GOUT 54 CTR:ZCLK 55 CTR:ZCLK 55 CTR:ZCLK 55 CTR:ZOLT 56 CTR:ZOUT 57 CTR:ZOUT 58 CTR:ZOUT 60 CTR:ZOUT 61 CTR:GATE 62 CTR:GOUT 63 CTR:SCLK 64 CTR:SCLK 64 CTR:SCLK 65 CTR:SOUT 66 CTR:CLK 67 CTR:GATE 68 CTR:GOUT 69 CTR:ZCLK 70 CTR:ZCLK 71 CTR:ZOUT 71 CTR:ZOUT 71 CTR:ZOUT 72 CTR:SCLK 73 CTR:SOUT 74 CTR:SOUT 75 CTR:SOUT 76 CTR:SOUT 77 CTR:SOUT 78 CTR:OUT 78 CTR:OUT 78 CTR:OUT 78 CTR:OUT 79 CTR:OUT 80 CTR:OUT 81 CTR:OUT 81 CTR:OUT 82 CTR:OUT 83 CTR:OUT 84 CTR:ZCLK 85 CTR:ZCLK 85 CTR:ZCLK 86 CTR:ZOUT 87 CTR:ZCLK 87 CTR:ZCLK 88 CTR:ZOUT 89 CTR:ZCLK 89 CTR:ZCLK 89 CTR:ZCLK 90 CTR:ZCLK 91 CTR:ZCLK 91 CTR:ZCLK 92 CTR:ZCLK 93 CTR:ZCLK 94 CTR:ZCLK 95 CTR:ZCLK 96 CTR:ZCLK 97 IR:ZCLK 98 CTR:ZCLK 99 CTR:ZCLK 90 CTR:ZCLK 91 CTR:ZCLK 91 CTR:ZCLK 92 CTR:ZCLK 93 CTR:ZCLK 94 CTR:ZCLK 94 CTR:ZCLK 95 CTR:ZCLK 94 CTR:ZCLK 95 CTR:ZCLK 96 CTR:ZCLK 97 IR:ZCLK 96 CTR:ZCLK 97 IR:ZCLK 98 CTR:ZCLK 99 CTR:ZCLK 90 CTR:ZCLK 91 CTR:ZCLK 91 CTR:ZCLK 92 CTR:ZCLK 94 CTR:ZCLK 94 CTR:ZCLK 95 CTR:ZCLK 96 CTR:ZCLK 97 IR:ZCLK 97 IR:ZCLK 98 CTR:ZCLK 99 CTR:ZCLK 90 CTR:ZCLK 91 CTR:ZCLK 91 CTR:ZCLK 92 CTR:ZCLK 94 CTR:ZCLK 95 CTR:ZCLK 96 CTR:ZCLK 97 IR:ZCLK 98 CTR:ZCLK 99 CTR:ZCLK 90 CTR:ZCLK 91 CTR:ZCLK 91 CTR:ZCLK 91 CTR:ZCLK 92 CTR:ZCLK 93 CTR:ZCLK 94 CTR:ZCLK 96 CTR:ZCLK 97 IR:ZCLK 97 IR:ZCLK 98 CTR:ZCLK 99 CTR:ZCLK 90 CTR:ZCLK 90 CTR:ZCLK 91 CTR:ZCLK 92 CTR:ZCLK 91 CTR:ZCLK 92 CTR:ZCLK 91

PCI-DIO48H/CTR15 Connector Diagram

Specifications

Digital	Input	1	Output	

Number of channels Configuration 18

Groups of 24: 2 banks of 8, 2 banks of 4, programmable by bank as input or output

I/O Device Type

TTL based 8255 mode 0 emulation

Output: 74S244 Input: 74LS373

Output High 2.4 volts min @ -15mA
Output Low 0.5 volts max @ 64 mA
Input High 2.0 volts min, 7 volts absolute max

Power-up / reset state Interrupts

0.8 volts max, -0.5 volts absolute min Input mode (high impedance) INTA# - mapped to IRQn via PCI BIOS at

boot-time

Interrupt enable

Input Low

External (IR ENABLE, active low, programmable through PCI9050-1;

programmable through PC19030-1; 0 = disabled, 1 = enabled (default) External source (IR INPUT), polarity programmable through PC19050-1; 1 = active high, 0 = active low (default)

Interrupt sources

Counter section
Configuration

82C54 w/three 16-bit down counters/82C54 PCI-DIO48H/CTR15 provides five 82C54s

82C54 pinouts:

Counter 0
Source: Available at connector
Gate: Available at connector
Output: Available at connector

Counter 1 -

Source: Available at connector
Gate: Available at connector
Output: Available at connector

Counter 2 -

Source: Available at connector
Gate: Available at connector
Output: Available at connector

Clock input frequency 10 Mhz max High pulse width (clk input) 30 ns min Low pulse width (clk input) 50 ns min Gate width high or low 50 ns min 0.8 V max Input low voltage Input high voltage 2.0 V min Output low voltage 0.4 V max 3.0 V min Output high voltage

Clock source oscillator section

Oscillator type 10 MHz crystal Initial tolerance ±0.005%
Temperature coefficient ±50 ppm/°C

Power consumption

+5 V 1395 mA typical, 1760 mA max

Environmental

Operating temperature 0 to 50°C Storage temperature -20 to 70°C

Humidity

0 to 90% non-condensing

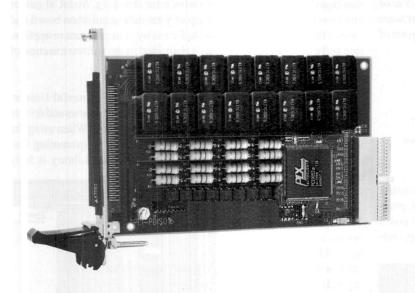
Ordering Guide

CPCI-DIO48H/CTR15

48-bit digital I/O, 15 counter/timer board for CPCI-bus computers.

CPCI-PDISO16 & CPCI-PDISO8

16 and 8 Channel, CompactPCI-bus Compatible, High Voltage, High Current Digital I/O Boards



Features

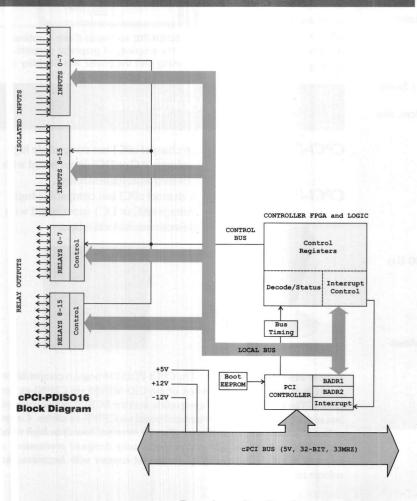
CPCI-PDISO16

- 16 high voltage (5V-28V) ac/dc digital input channels
- 16 form C electromechanical relays
- 3 Amp, 120 Vac output control
- Register & Connector compatible with CIO-PDISO16

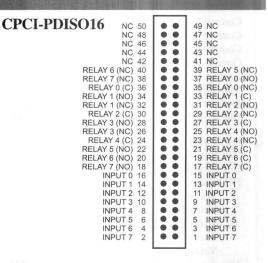
CPCI-PDISO8

- 8 high voltage (5V-28V) ac/dc digital input channels
- 5 form C, 3 form A (NO) relays
- 3 Amp, 120 Vac output control
- Register & Connector compatible with CIO-PDISO8

Block Diagram



Connector Diagrams

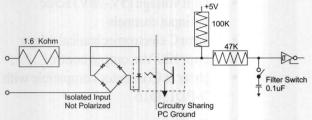


CPCI-PDISO8

	and the second of the second o
RELAY 0 (NO) 19 RELAY 0 (NC) 18 RELAY 1 (C) 17 RELAY 2 (NO) 16 RELAY 2 (NO) 16 RELAY 3 (C) 14 RELAY 4 (NO) 13 RELAY 4 (NC) 12 RELAY 6 (C) 11 RELAY 6 (C) 10 RELAY 7 (C) 9 INPUT 0 8 INPUT 0 8 INPUT 1 7 INPUT 2 6 INPUT 3 5 INPUT 4 4 INPUT 5 3 INPUT 6 2 INPUT 7 1	31 RELAY 4 (C) 30 RELAY 5 (NO) 29 RELAY 6 (NO) 28 RELAY 7 (NO) 27 INPUT 0

Functional Description

The CPCI-PDISO16 and CPCI-PDISO8 combine isolated AC or DC inputs and electromechanical relays on a single CompactPCI-bus compatible board. The CPCI-PDISO16 provides sixteen 24 Vac or dc inputs and 16 form C, 3 Amp relays. The CPCI-PDISO8 offers eight 24 Vac or dc and eight 3 Amp relay outputs (5 form C, 3 form A). A software enabled input filter is available on all channels. A schematic diagram of one of the input channels is shown below.



The boards are fully connector compatible with their ISA counterparts (CIO-PDISO16 & CIO-PDISO8). Both boards are also completely plugand-play. There are no switches, or jumpers on the board. All board addresses, interrupt channels etc. are set by your computers plug-and-play software.

Specifications

Relay Specifications

Contact Configuration

CPCI-PDISO16 16 form C

CPCI-PDISO8 5 form C, 3 form A (NO) atact Rating 3A @ 120 Vac or 28 Vdc resistive

Contact Rating 3A @ 120 Vac or 28 V Contact Type Gold overlay silver Contact Resistance 100 milliohms max

Operate Time 20 milliseconds
Release Time 10 milliseconds max

Vibration 10 to 55 Hz (dual amplitude 1.5mm)

Dielectric Isolation 500 V (1 minute)

Life Expectancy 10 million mechanical operations, min

Isolated Inputs

CPCI-PDISO16 16 CPCI-PDISO8 8

DC input ranges

Vin low 1.8 V, max Vin high 5 V, min

AC input ranges (50-1000Hz)

Vin low 1.8 Vp-p, max Vin high 5.0 Vp-p, min

Max input voltage 28 Vdc, or 28VRMS (50-1000 Hz)

Isolation 500V

Resistance 1.6 kilohms min
Response w/o filter 20 uS (without filter)
5 mS (with filter)

Individually programmable,

Filters disabled on power-up/reset

Power consumption (+5V)

Filter Control

CPCI-PDISO16 0.7 A, all relays OFF 2.0 A, all relays ON

CPCI-PDISO8 0.4 A, all relays OFF

1.0 A, all relays ON

Environmental

Operating / storage temp 0 to 50 °C / -20 to 70 °C Humidity 0 to 90% non-condensing

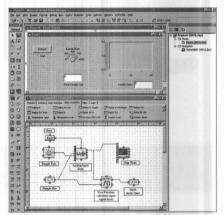
Software

The CPCI-PDISO series boards come complete with ComputerBoards' powerful *Insta* CalTM software package. *Insta* Cal is a complete installation, calibration and test program for ComputerBoards data acquisition boards. Complete with extensive error checking, *Insta*Cal guides you through installation and setup of your data acquisition board and creates the board configuration file for use by your program or application software package. *Insta*Cal is described in the software section of this handbook.

The boards are fully supported by ComputerBoards' powerful Universal Library. Universal Library is a complete set of I/O libraries and drivers for all of our boards, for all Windows based languages. When using the Universal Library you can switch boards or even programming languages and the syntax remains constant. Universal Library is fully

described in the software section of this handbook.

The CPCI-PDISO series boards are fully supported by a wide variety of applications software packages including SoftWIRE™, DAS-Wizard™, (and DAS-WizardPro™), HPVEE®, HPVEE Lab and LabVIEW™. For further details on these, as well as a variety of other software packages, please refer to the software section provided earlier in this catalog.



SoftWIRE for Visual Basic combines the simplicity of graphical programming with the power and flexibility of programming in VB!

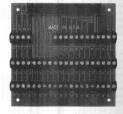
Ordering Guide

CPCI-PDISO16

CPCI-PDISO8

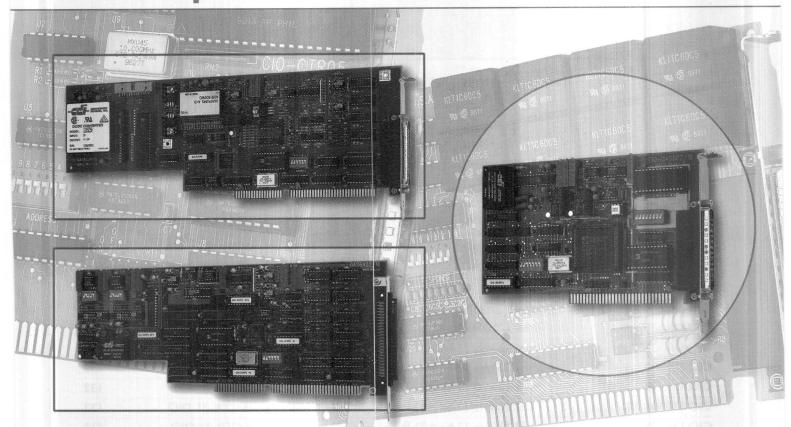


16 channel cPCI bus compatible high voltage (AC or DC) input board with 16 electromechanical relays. 8 channel cPCI bus compatible high voltage (AC or DC) input board with 8 electromechanical relays.



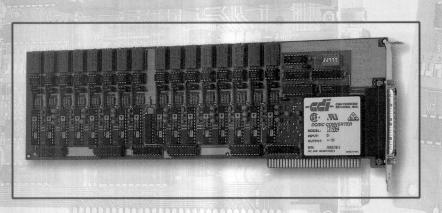
Screw Terminal Boards The CPCI-PDIS016 board is compatible with the SCB-50 screw connection box or the CIO-MIN50 via CFF50-xx series cables. The CPCI-PDISO8 is compatible with the SCB-27 screw connection box or the CIO-MINI37 screw terminal board via C37FF-xx cables. ComputerBoards cautions against the use of screw terminal boards in high voltage applications unless specific and professionally designed precautions are taken to avoid the possibility of accidental contact with hazardous high voltage signals.

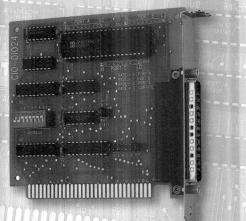
Data Acquisition & Control for the ISA Bus



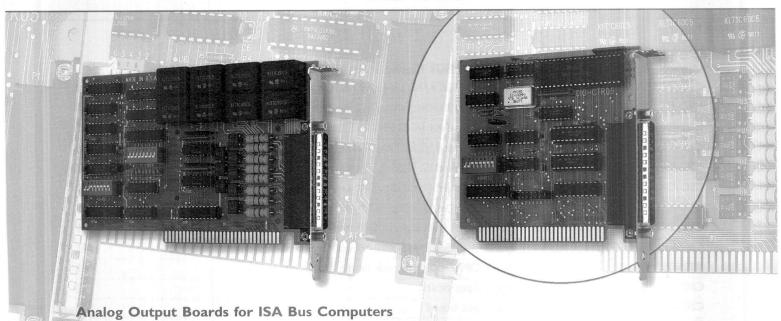
High Speed Analog	Input and I/O Boards (CIO-DAS16 and CIO-DAS1600 series)	
CIO-DAS16/M1/16	8-channel MHz 16-bit A/D with DT-Connect, 24 digital /O	127
CIO-DAS16/MI	8-channel I MHz I2-bit A/D with DT-Connect, 24 digital I/O and 3 counters	127
CIO-DAS16/330	16-channel 330-kHz 12-bit A/D with Programmable Gain, 3 CTR, 8 DIO	127
MEGA-FIFO	4, 16, 32 or 128 MEGA SAMPLE DT-Connect FIFO for A/D Boards	128
CIO-DAS1602/16	16-channel 100-kHz 16-bit A/D with Burst Mode & Prog Gain, 2 D/A, 32 DIO	128
CIO-DAS6402/16	64-channel 100-kHz 16-bit A/D, 2 16-Bit D/A, 16 Digital I/O, 3 CTR	128
CIO-DAS6402/12	64-channel 330-kHz 12-bit A/D, 2 12-Bit D/A, 16 Digital I/O, 3 CTR	129
CIO-DAS1602/12	16-channel 160-kHz 12-bit A/D with 4uS Burst Mode & Prog Gain, 2 D/A, 32 DIO	129
CIO-DAS1601/12	16-channel 160-kHz 12-bit A/D with 4uS Burst Mode & Prog Gain, 2 D/A, 32 DIO	129
CIO-DAS16F	16-channel 100-kHz 12-bit A/D, 2 Channel D/A, 32 Digital I/O	130
CIO-DAS16	16-channel 50-kHz 12-bit A/D, 2 Channel D/A, 32 Digital I/O	130
CIO-DAS16JR/16	16-channel 100-kHz 16-bit A/D with Programmable Gains, 3CTR, 8 DIO	130
CIO-DAS16/JR	16-channel 130-kHz 12-bit A/D with Programmable Gains, 3 CTR, 8 DIO	130
CIO-DAS16/JR/CTR5	16-channel 130-kHz 12-bit A/D with Programmable Gains, 8 CTR, 8 DIO	130
CIO-DAS1402/16	16-channel 100-kHz 16-bit A/D with 10uS Burst Mode & Prog Gain	131
CIO-DAS1401/12	16-channel 160-kHz 12-bit A/D with 4uS Burst Mode & Prog Gain	131
CIO-DAS1402/12	16-channel 160-kHz 12-bit A/D with 4uS Burst Mode & Prog Gain	131
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Data Acquisition & Control for the ISA Bus





General Purpose Ana	alog Input and I/O Boards (CIO-DAS8 and CIO-DAS800 series)	
CIO-DAS802/16	8-channel 100-kHz 16-bit A/D Prog Gain 7 digital I/O, 3 CTR	131
CIO-DAS801	8-channel 50-kHz 12-bit A/D Prog Gain 7 digital I/O, 3 CTR	132
CIO-DAS802	8-channel 50-kHz 12-bit A/D Prog Gain 7 digital I/O, 3 CTR	132
CIO-DAS800	8-channel 50-kHz 12-bit A/D Fixed Gain 7 digital I/O, 3 CTR	132
CIO-DAS08-AOH	8-channel 20-kHz 12-bit A/D Prog High-Gain, 2 12-bit D/A, 3 CTR, 31 DIO	132
CIO-DAS08-AOL	8-channel 20-kHz 12-bit A/D Prog Low-Gain, 2 12-bit D/A, 3 CTR, 31 DIO	132
CIO-DAS08-AOM	8-channel 20-kHz 12-bit A/D Prog KM Comp-Gain, 2 12-bit D/A, 3 CTR, 31 DIO	132
CIO-DAS08-PGH	8-channel 20-kHz 12-bit A/D Prog High-Gain, 3 CTR, 7 digital I/O	132
CIO-DAS08-PGL	8-channel 20-kHz 12-bit A/D Prog Low-Gain, 3 CTR, 7 digital I/O	132
CIO-DAS08-PGM	8-channel 20-kHz 12-bit A/D Prog KM Comp-Gain, 3 CTR, 7 digital I/O	132
CIO-DAS08	8-channel 20-kHz 12-bit A/D, 3 Counters, 31 digital I/O	133
CIO-DAS08/JR/16-AO	8-channel 30 Hz 16-bit A/D, 2 16-bit D/A, 16 digital I/O	133
CIO-DUAL-DAC/16	2-channel output chip to add two channels to CIO-DDA06/JR/16 or DAS08/JR/16	133
CIO-DAS08/JR/16	8-channel 30 Hz 16-bit A/D, 16 digital I/O	133
CIO-DAS08/JR-AO	8-channel 20-kHz 12-bit A/D, 2 Channels D/A, 16 digital I/O	133
CIO-DAS08/JR	8-channel 20-kHz 12-bit A/D, 16 digital I/O	133
CIO-DAS48-PGA	48-channel 20-kHz 12-bit A/D, Software programmable gains	134
CIO-DAS48-I	48-channel 20-kHz 12-bit A/D, current input with Software programmable gains	134
Temperature Measur	rement Boards for ISA Bus Computers	
CIO-DAS-TEMP	32-channel semiconductor temperature sensor board for AD592	134
SNSR-AD592-PRBICN	I-inch stainless steel, +/- 0.5°C temperature probe for CIO-DAS-TEMP	134
SNSR-AD592-PRB6CN	6-inch stainless steel, +/- 0.5°C temperature probe for CIO-DAS-TEMP	134
SNSR-AD592-TO2	Plastic TO2 (three terminal) +/- I °C temperature probe for CIO-DAS-TEMP	134
CIO-DAS-TC	16-ch. Thermocouple board including screw terminal board & 5' shielded cable	134
THERMOCOUPLES	Our thermocouples are described in sensors section of this catalog	256



Analog Output Boa	ards for ISA Bus Computers	
CIO-DAC16/16	16-channel 16-bit analog output board	135
CIO-DAC08/16	8-channel 16-bit analog output board	135
CIO-DAC16	16-channel 12-bit analog output board	135
CIO-DAC16-I	16-channel 12-bit analog output board (current outputs)	135
CIO-DAC08	8-channel 12-bit analog output board	135
CIO-DACO8-I	8-channel 12-bit analog current output board	135
CIO-DAC04/12-HS	4-channel 12-bit, 500-kHz D/A board, 16 digital I/O	136
CIO-DDA06/16	6-channel 16-bit analog output, 24 digital I/O	136
CIO-DDA06	6-channel 12-bit analog output, 24 digital I/O	137
CIO-DDA06/JR/16	6-channel 16-bit analog +/-5 V output, 24 digital I/O (2 D/A Channels installed)	137
CIO-DUAL-DAC/16	2-channel output chip to add two channels to CIO-DDA06/JR/16 or DAS08/JR/16	137
CIO-DDA06/JR	6-channel 12-bit analog +/-5 V output, 24 digital I/O (2 D/A Channels installed)	137
CIO-DUAL-DAC	2-channel D/A chip adds 2 analog outputs to CIO-DAS08/JR or CIO-DDA06/JR	137
CIO-DAC02/16	2 -channel 16-bit analog output board	138
CIO-DAC02	2-channel 12-bit analog output board (voltage or current loop outputs)	138
Counter and Timer	Boards for ISA Bus Computers	
CIO-CTR20HD	20-channel Counter Timer (4, 9513) / 100ppM XTAL	138
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CIO-CTRI0HD	10-channel Counter Timer (2, 9513) / 100ppM XTAL	138
CIO-CTR10HD/H50	10-channel Counter Timer (2, 9513) / 50ppM XTAL	138
CIO-CTRI0	10-channel Counter Timer (2, 9513) with 16 DI and 16 DO / 100ppM XTAL	138
CIO-CTR10/H50	10-channel Counter Timer (2, 9513) with 16 DI and 16 DO / 50ppM XTAL	138
CIO-CTR05	5-channel Counter Timer (9513) with 8 D In and 8 D Out / 100ppM XTAL	139
CIO-CTR05/H50	5-channel Counter Timer (9513) with 8 D In and 8 D Out / 50ppM XTAL	139
CIO-INT32	32-bit interrupt generator, 40 bit digital I/O board or 6 channel counter board	139
CIO-QUAD04	4-channel Quadrature Encoder Board	139
CIO-QUAD02	2-channel Quadrature Encoder Board	139

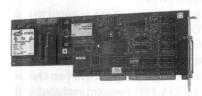
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Data Acquisition & Control for the ISA Bus

CIO-PDMA32	16-bit high speed (500 KHz) digital I/O board with AT bus DMA & REP INSW	140
CIO-PDMA16	16-bit high speed (120 KHz) digital I/O board with XT bus DMA	140
CIO-DIO192	192-bit digital I/O board (8, 8255s), TTL Level	140
CIO-DIO96	96-bit digital I/O board (4, 8255s), TTL Level	140
CIO-DIO48	48-bit digital I/O board (2, 8255s), TTL Level	140
CIO-DIO24	24-bit digital I/O board (1, 8255s), TTL Level	140
CIO-DIO48H	48-bit high-drive (64 mA) digital I/O board, emulates 8255 Mode 0	141
CIO-DIO24H	24-bit high-drive (64 mA) digital I/O board, emulates 8255 Mode 0	141
CIO-DIO24/CTR3	24-bit digital I/O (8255) PLUS 3 16-bit counters (8254)	141
CIO-DUAL-AC5	Dual standard OPTO-22 AC5 rack driver board	141
CIO-DI192	192-bit digital input board	142
CIO-DI96	96-bit digital input board	142
CIO-DI48	48-bit digital input board	142
CIO-DISO48	48-bit isolated digital input board, 0-28 VAC/VDC Inputs	142
CIO-DO192H	192-bit high drive (64ma) digital output board	142
CIO-DO96H	96-bit high drive (64ma) digital output board	142
CIO-DO48H	48-bit high drive (64ma) digital output board	142
CIO-DO48DD	48-bit high voltage digital output board (50VDC, 500mA)	143
CIO-DO24DD	24-bit high voltage digital output board (50VDC, 500mA)	143
CIO-PDISO16	16 Electromechanical relays, 16 isolated (500V) digital input board	143
CIO-PDISO8	8 Electromechanical relays, 8 isolated (500V) digital input board	143
CIO-RELAY32	32 Electromechanical relays (Form C)	143
CIO-RELAY24	24 Electromechanical Relays, Form C, (3/4 Populated RELAY32)	143
CIO-RELAYI6	16 Electromechanical relays (Form C)	144
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NATIONAL INST	RUMENTS™ Compatible Digital I/O Boards	
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NICB-DIO96	96-bit digital I/O board	144

DAS-16 FAMILY ANALOG I/O

CIO-DAS16/M1/16



• 8 differential input channels

• 16-bit A/D (1 part in 65536)

• 1 MHz sample rate to MEGA-

FIFO (using DT-Connect)

· 1024 byte on-board FIFO

Analog Input Specifications

Max sample size

Input ranges

Channels 8 fully differential A/D type subranging Conversion time 0.8uS Max sample rate 1 MHz (single- or multi-

channel) to MEGA-FIFO 750 KHz direct to PC memory

128 Mega samples

w/full MEGA-FIFO brd $\pm 5V$, $\pm 2.5V$, $\pm 1.25V$, $\pm .625$

0 to 10V, 5V, 2.5V, 1.25V

> 10 Megohm

Input impedance Range selection Software programmable

Trigger modes Standard trigger Digital Input/Output (see page 271 for dig. specs)

24-bits, CMOS in 2 banks Configuration

of 8, 2 banks of 4 8-bits TTL, 4 in, 4 out

Counters 3, dedicated to A/D timing

Software Description

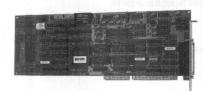
Includes InstaCal, installation, calibration and test software. Supported by the Universal Library programming language library. Also supported by SoftWIRE, DAS Wizard, HP VEE LAB and most third party, high-level data acquisition programs.

Cables / Screw Terminal Boards

Analog: C37FF-# / CIO-MINI37 or SCB-37 Digital: BP40-37 & C37FF-# / CIO-MINI37

CIO-DAS16/M1

• 32 Digital I/O



Features

Features

- 8 differential input channels
- 12-bit A/D (1 part in 4096)
- 1 MHz sample rate to MEGA-FIFO (using DT-Connect)
- 256 step channel/gain queue
- 9 CTRs, 32 Digital I/O

Analog Input Specifications

8 fully differential Channels A/D type subranging flash Conversion time 0.8uSMax sample rate 1 MHz (single-chan)

(to MEGA-FIFO) 500 KHz (multi-chan) 100 KHz (w/ gain change) Max sample size 128 Mega samples

w/full MEGA-FIFO brd 330KHz (multi-channel) Max sample rate

Input ranges $\pm 10V$, $\pm 5V$, $\pm 2.5V$, $\pm 1.25V$, $\pm .625$ 0 to 10V, 5V, 2.5V, 1.25V Range selection Software programmable

Input impedance > 10 Megohm Trigger modes Pre-trigger, Post-trigger

and standard trigger.

Digital Input/Output (see page 271 for dig. specs)

24-bits, CMOS in 2 banks Configuration

> of 8, 2 banks of 4 8-bits TTL, 4 in, 4 out 9, 4 available to user

Software Description

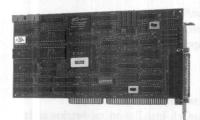
Counters

Includes InstaCal, installation, calibration and test software. Supported by the Universal Library programming language library. Also supported by SoftWIRE, DAS Wizard, HP VEE LAB and most third party, high-level data acquisition programs.

Cables / Screw Terminal Boards

Analog: C37FF-# / CIO-MINI37 or SCB-37 Digital: BP40-37 & C37FF-# / CIO-MINI37

CIO-DAS16/330



Features

- 8 ch diff. / 16 single-ended
- 12-bit A/D (1 part in 4096)
- · 330 Khz sample rate
- 1024 sample FIFO
- DT-Connect compatible
- · MEGA-FIFO compatible
- CIO-SSH-16 compatible

Analog Input Specifications

Input resolution 12-bits (1 in 4096) Input ranges $\pm 10V, \pm 5V, \pm 2.5V, \pm 1.25V, \pm .625V$,

0 to 10V, 5V, 2.5V, 1.25V

Range selection Software programmable Max sample rate 330KHz (using 1024 sample FIFO & REP INSW xfers)

160KHz (using DMA)

Sample rate set by Internal or external clock Triggering Modes Pre-, Post- or Std- trigger Input Impedance Greater than 10 Megohm

Simultaneous Sample & Hold w/CIO-SSH-16

Channels up to 16 Aperture time 175 nSec (avg) Aperture uncertainty ± 25 nSec Digital I/O

8-bits TTL, 4 in, 4 out

Software Description

Includes InstaCal, installation, calibration and test software. Supported by the Universal Library programming language library. Also supported by SoftWIRE, DAS Wizard, HP VEE LAB and most third party, high-level data acquisition programs.

Standard I/O Connection:

Mating cable: C37FF-# series

Screw terminal board: CIO-MINI37 or SCB-37

For Simultaneous Sample & Hold Operation

Cable: SSH board

C37FF-# series CIO-SSH-16

MEGA-FIFO



Features

- · Allows acquisition of up to 128 million samples
- · Frees up PC bus for other uses
- · 1 million sample/sec xfer rate
- · Uses standard 256K, 1MB, 4 MB & 16 MB SIMMS

Description

The MEGA-FIFO allows you to acquire up to 128 million samples of A/D data without using any CPU or bus time. Because the MEGA-FIFO employs the DT-Connect board-to-board link, the PC bus is bypassed entirely. Supporting both DT-Connect in and out, the MEGA-FIFO may be used to hold sampled data or to update an output board. Windows and high performance accessories pose significant resource challenges to fast A/D applications. To acquire large sample sets at high speed the data acquisition system must bypass the PC bus.

Specifications

Memory Transfer rates

Trigger/timing

Up to 128 MB

1 MHz (w/DT-Connect)

Software Description

There is very little programming required to use a MEGA-FIFO. First, the data acquisition board must be set to transfer samples to the DT-Connect; a simple matter with ComputerBoards A/D boards. From high level languages you have two choices. Employ the MEGA-FIFO support included in the Universal Library (please see the data sheet on the Universal Library). Alternately you may program the MEGA-FIFO directly using the I/O registers.

Compatible with the following A/D boards CIO-DAS16/M1/16, CIO-DAS16/M1 CIO-DAS16/330, CIO-DAS1600 series (DT-CONNECT cable included with board)

CIO-DAS1602/16 & CIO-DAS1602/16-P5





Features

- 8 ch diff. / 16 single-ended
- 16-bit, 100KHz A/D
- · Burst mode A/D timing
- Dual 12-bit D/As
- 512 sample FIFO
- · MEGA-FIFO compatible
- 3 counters, 32 digital I/O

Analog Input Specifications

Input resolution 16-bits (1 in 65536) Input ranges $\pm 10V$, $\pm 5V$, $\pm 2.5V$, $\pm 1.25V$,

0 to 10V, 5V, 2.5V, 1.25V Software programmable

Range selection Max sample rate 100 KHz (utilizes 512 sample FIFO & DMA xfers)

Int/ext clock, edge or level

trigger, burst-mode support Input Impedance Greater than 10 Megohm

-P5 version is for use in obstructed slots. -P5 only has 8 digital I/O bits, 4 in, 4 out, all TTL

Digital Input/Output (see pg. 271 for family specs) Number of bits 24 CMOS, 2 banks of 8, 2 of 4 8 TTL bits, 4 input, 4 output

Analog Output Specifications

Channels

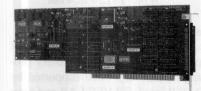
Resolution 12-bits (1 in 4096) Output ranges ±10V, ±5V, 0-5V, 0-10V Output drive ±5 mA minimum

Software Description

Includes InstaCal, installation, calibration and test software. Supported by the Universal Library programming language library. Also supported by SoftWIRE, DAS Wizard, HP VEE LAB and most third party, high-level data acquisition programs.

Cables / Screw Terminal Boards Analog: C37FF-# / CIO-MINI37 or SCB-37 Digital: BP40-37 & C37FF-# / CIO-MINI37

CIO-DAS6402/16



Features

- 32 ch diff. / 64 single-ended
- 16-bit A/D resolution
- 100Khz sample rate
- 10 uS burst mode
- Dual 16-bit D/As
- 1024 sample FIFO
- 16-bits digital I/O
- 3 CTRs

Analog Input Specifications

Input resolution 16-bits (1 in 65536) Input ranges $\pm 10V$, $\pm 5V$, $\pm 2.5V$, $\pm 1.25V$, 0 to 10V, 5V, 2.5V, 1.25V

Range selection Software programmable Max sample rate 100 KHz (utilizes

FIFO & REP INSW xfers) Trigger/timing Int/ext clock, edge or level

trigger, 10 uS burst-mode Input Impedance Greater than 10 Megohm

Analog Output Specifications

Channels/Resolution 2 / 16-bits (1 in 65536)

Output ranges ±10V, ±5V, ±2.5V 0-10V, 0-5V, 0-2.5V

Output drive ±2 mA minimum

Digital Input/Output

Number of bits 16, 8 input, 8 output Digital I/O specs TTL series (see page 271) Counters 3, dedicated to A/D

timing

Software Description

Includes InstaCal, installation, calibration and test software. Supported by the Universal Library programming language library. Also supported by SoftWIRE, DAS Wizard, HP VEE LAB and most third party, high-level data acquisition programs...

I/O Connection: single 100-pin connector

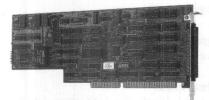
Mating cable: C100FF-# series

Screw terminal board: Requires two CIO-MINI50

or one SCB-50

DAS-16 FAMILY ANALOG I/O

CIO-DAS6402/12



Features

- 32 ch diff. / 64 single-ended
- 12-bit A/D resolution
- 330 KHz sample rate
- · 3.3 uS burst mode
- Dual 12-bit D/As
- 1024 sample FIFO
- 16-bits digital I/O
- 3 CTRs

Analog Input Specifications

Input resolution 12-bits (1 in 4096)

Input ranges $\pm 10V$, $\pm 5V$, $\pm 2.5V$, $\pm 1.25V$,

0 to 10V, 5V, 2.5V, 1.25V

Range selection Software programmable Max sample rate

330 KHz (utilizes

FIFO & REP INSW xfers)

Int/ext clock, edge or level trigger, 3.3 uS burst-mode

Input Impedance Greater than 10 Megohm

Analog Output Specifications

Channels

Trigger/timing

12-bits (1 in 4096) Resolution

±10V, ±5V, 0-5V, 0-10V Output ranges

Output drive ±2 mA minimum

Digital Input/Output

Number of bits Digital I/O specs

16, 8 input, 8 output TTL series (see page 271)

3, dedicated to A/D Counters

timing

Software Description

Includes InstaCal, installation, calibration and test software. Supported by the Universal Library programming language library. Also supported by SoftWIRE, DAS Wizard, HP VEE LAB and most third party, high-level data acquisition programs.

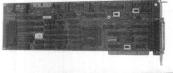
I/O Connection: single 100-pin connector

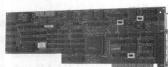
Mating cable: C100FF-# series

Screw terminal board: Requires two CIO-MINI50

or one SCB-50

CIO-DAS1602/12 & CIO-DAS1602/12-P5





Features

- 8 ch diff. / 16 single-ended
- 12-bit, 160KHz A/D
- Burst mode, SSH-16 compatible
- Dual 12-bit D/As
- 512 sample FIFO
- MEGA-FIFO compatible
- 3 counters, 32 digital I/O

Analog Input Specifications

Input resolution Input ranges

Trigger/timing

12-bits (1 in 4096) $\pm 10V$, $\pm 5V$, $\pm 2.5V$, $\pm 1.25V$,

Range selection Max sample rate 0 to 10V, 5V, 2.5V, 1.25V Software programmable 160 KHz (utilizes 512 sample

FIFO and DMA transfers)

Int/ext clock, edge or level trigger, burst-mode support

Input Impedance Greater than 10 Megohm

-P5 version is for use in obstructed slots. -P5 only has 8 digital I/O bits, 4 in, 4 out, all TTL

Digital Input/Output (see pg. 271 for family specs) 24 CMOS, 2 banks of 8, 2 of 4 Number of bits

Analog Output Specifications

Channels

2, 12-bit resolution ±10V, ±5V, 0-5V, 0-10V

Output ranges Output drive

±5 mA minimum

Software Description

Includes InstaCal, installation, calibration and test software. Supported by the Universal Library programming language library. Also supported by SoftWIRE, DAS Wizard, HP VEE LAB and most third party, high-level data acquisition programs.

Cables / Screw Terminal / Acces. Boards

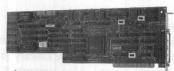
Analog: C37FF-# / CIO-MINI37 or SCB-37 Digital: BP40-37 & C37FF-#/CIO-MINI37

Simultaneous S&H: C37FF-# / CIO-SSH-16

CIO-DAS1601/12 & CIO-DAS1601/12-P5

Input ranges





Features

- 8 ch diff. / 16 single-ended
- 12-bit, 160KHz A/D
- Burst mode, SSH-16 compatible
- Dual 12-bit D/As
- 512 sample FIFO
- · MEGA-FIFO compatible
- 3 counters, 32 digital I/O

Analog Input Specifications

Input resolution 12-bits (1 in 4096)

 $\pm 10V$, $\pm 1V$, $\pm 0.1V$, $\pm 0.01V$, 0 to 10V, 1V, 0.1V, 0.01V Software programmable

8 TTL bits, 4 input, 4 output

Range selection Max sample rate 160 KHz (utilizes 512 sample FIFO and DMA transfers)

Trigger/timing Int/ext clock, edge or level trigger, burst-mode support

Input Impedance Greater than 10 Megohm

-P5 version is for use in obstructed slots. -P5 only has 8 digital I/O bits, 4 in, 4 out, all TTL

Digital Input/Output (see pg. 271 for family specs) Number of bits 24 CMOS, 2 banks of 8, 2 of 4

8 TTL bits, 4 input, 4 output

Analog Output Specifications

Channels 2, 12-bit resolution Output ranges ±10V, ±5V, 0-5V, 0-10V

Output drive ±5 mA minimum

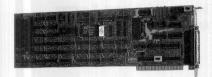
Software Description

Includes InstaCal, installation, calibration and test software. Supported by the Universal Library programming language library. Also supported by SoftWIRE, DAS Wizard, HP VEE LAB and most third party, high-level data acquisition programs.

Cables / Screw Terminal / Acces. Boards Analog: C37FF-# / CIO-MINI37 orSCB-37

Digital: BP40-37 & C37FF-# / CIO-MINI37 Simultaneous S&H: C37FF-# / CIO-SSH-16

CIO-DAS16/F & CIO-DAS16



Features

- 8 ch diff. / 16 single-ended
- 12-bit A/D resolution
- 100Khz sample rate (16/F)
- 50KHz sample rate (16)
- Dual 12-bit D/As
- · 32-bits digital I/O
- 3 CTRs (2 for A/D timing)

Analog Input Specifications

Input resolution 12-bits (1 in 4096)

Input ranges $\pm 10V, \pm 5V, \pm 2.5V, \pm 1V, \pm .5V$

0 to 10V, 5V, 2V, 1V

32, 2 banks of 8, 2 of 4

3, 2 dedicated to A/D

timing, 1 available to user

Range selection Dip switch selectable Max sample rate 100KHz - DAS16/F

50KHz - DAS16

Trigger/timing Int/ext clock, edge or level

trigger

Input Impedance Greater than 10 Megohm

Input/output specs 24 CMOS, 8 TTL, see pg 271

Software Description

Channels

Output ranges

Output drive

Analog Output Specifications

Includes *Insta*Cal, installation, calibration and test software. Supported by the Universal Library programming language library. Also supported by SoftWIRE, DAS Wizard, HP VEE LAB and most third party, high-level data acquisition programs.

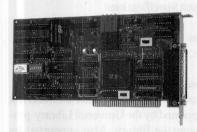
0-5V

2, 12-bit resolution

±5 mA minimum

Cables / Screw Terminal / Acces. Boards Analog: C37FF-# / CIO-MINI37 or SCB-37 Digital: BP-37 & C37FF-# / CIO-MINI37 Simultaneous S&H: C37FF-# / CIO-SSH-16

CIO-DAS16JR/16



Features

- 8 ch diff. / 16 single-ended
- 16-bit, 100KHz A/D
- · 4 digital inputs
- 4 digital outputs
- 3 counter timers

Analog Input Specifications

Digital Input/Output

Number of bits

Counters

Input resolution 16-bits (1 in 65536)

Input ranges $\pm 10V$, $\pm 5V$, $\pm 2.5V$, $\pm 1.25V$,

0 to 10V, 5V, 2.5V, 1.25V

Range selection Software programmable Max sample rate 100 KHz (utilizes DMA

transfers)

Trigger/timing Int/ext clock, edge or level

trigger

Input Impedance Greater than 10 Megohm

Digital Input/Output

Input bits 4, TTL family (see pg. 271)
Output bits 4, TTL family (see pg. 271)

Counter/Timer

Counters 3, 16-bit (8254), 2 dedicated

to A/D timing

Software Description

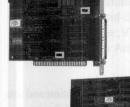
Includes *InstaCal*, installation, calibration and test software. Supported by the Universal Library programming language library. Also supported by SoftWIRE, DAS Wizard, HP VEE LAB and most third party, high-level data acquisition programs.

Cables / Screw Terminal Boards

Screw terminal: C37FF-# / CIO-MINI37 or

C37FF-# / SCB-37

CIO-DAS16JR & CIO-DAS16JR/CTR5



Features

- 8 ch diff. / 16 single-ended
- 12-bit, 130KHz A/D
- 8 digital I/O bits
- 3 counter timers (std 16JR)
- 8 counter timers (16JR/CTR)

Analog Input Specifications

Input resolution 12-bits (1 in 4096)

Input ranges ±10V, ±5V, ±2.5V, ±1.25V, 0 to 10V, 5V, 2.5V, 1.25V

Range selection Software programmable
Max sample rate 130 KHz (utilizes DMA

transfers)

Trigger/timing Int/ext clock, edge or level

trigger

Input Impedance Greater than 10 Megohm

Counter/Timer

Std counters 3, 16-bit (8254), 2 dedicated

to A/D timing

/CTR adds 5, 16-bit, CIO-CTR5 compatible (9513 type)

Digital Input/Output

Input bits 4, TTL family (see pg. 271)
Output bits 4, TTL family (see pg. 271)

Output bits 4, TTL family (see pg. 271) /CTR version adds 8 input/8 output (TTL)

Software Description

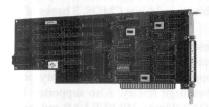
Includes *Insta*Cal, installation, calibration and test software. Supported by the Universal Library programming language library. Also supported by SoftWIRE, DAS Wizard, HP VEE LAB and most third party, high-level data acquisition programs.

Cables / Screw Terminal Boards Analog: C37FF-# / CIO-MINI37

Simultaneous S&H: C37FF-# / CIO-SSH-16

/CTR option: BP-37 & C37FF-# / CIO-MINI37

CIO-DAS1401/12 & CIO-DAS1402/12



Features

- 8 ch diff. / 16 single-ended
- 12-bit, 160KHz A/D
- Burst-mode A/D timing
- 512 sample FIFO
- 3 counters
- 8-bits digital I/O

Analog Input Specifications

Input resolution 12-bits (1 in 4096)

Input ranges

CIO-DAS1401/12 $\pm 10V$, $\pm 1V$, $\pm 0.1V$, $\pm 0.01V$, 0 to 10V, 1V, 0.1V, 0.01V

CIO-DAS1402/12 $\pm 10V$, $\pm 5V$, $\pm 2.5V$, $\pm 1.25V$,

Max sample rate

Trigger/timing

Input Impedance

0 to 10V, 5V, 2.5V, 1.25V Software programmable

Range selection Bi/Unipolar select On-board switch

> 160 KHz (utilizes 512 sample FIFO & DMA xfers)

Int/ext clock, edge or level

trigger, burst-mode support Greater than 10 Megohm

Digital Input/Output

Number of bits Digital I/O specs 8, 4 input, 4 output TTL series (see page 271)

Counters

3 CMOS, 8254 series

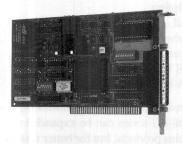
Software Description

Includes InstaCal, installation, calibration and test software. Supported by the Universal Library programming language library. Also supported by SoftWIRE, DAS Wizard, HP VEE LAB and most third party, high-level data acquisition programs..

Cables / Screw Terminal Boards

Analog: C37FF-# / CIO-MINI37 or SCB-37 Simultaneous S&H: C37FF-# / CIO-SSH-16

CIO-DAS802/16



Features

- 8 ch differential or single-ended
- 16-bit,100KHz A/D
- 256 sample FIFO
- 3 counters
- 7-bits digital I/O

Analog Input Specifications

Input resolution 16-bits (1 in 65536)

 $\pm 10V$, $\pm 5V$, $\pm 2.5V$, $\pm 1.25V$, Input ranges 0 to 10V, 5V, 2.5V, 1.25V

> Software programmable Switch selectable by channel 100 KHz (utilizes 256 sample

FIFO & REP INSW xfers) Trigger/timing Int/ext clock

Input Impedance Greater than 10 Megohm

Digital Input/Output

Range selection

Max sample rate

Diff/SE

Number of bits 7-bits, 4 output, 3 input Input/output specs TTL family (see pg. 271) Counter timers

3, 16-bit (8254 series)

Software Description

Includes InstaCal, installation, calibration and test software. Supported by the Universal Library programming language library. Also supported by SoftWIRE, DAS Wizard, HP VEE LAB and most third party, high-level data acquisition programs.

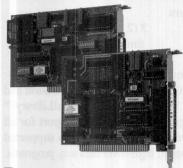
Channel Expansion and Signal Conditioning

For more channels See CIO-EXP-series For isolated inputs See ISO-RACK08 For RTD or bridges See EXP-GP, RTD or BRIDGE16

Cables / Screw Terminal / Expansion Boards Screw terminal: C37FF-# / CIO-MINI37 or

C37FF-# / SCB-37

CIO-DAS802, CIO-DAS801 & CIO-DAS800



Features

- 8 ch differential or single-ended (DAS-800 is single-ended only)
- 12-bit, 50KHz A/D
- 256 sample FIFO
- 3 counters, 7-bits digital I/O

Analog Input Specifications

Input resolution 12-bits (1 in 4096) Input ranges: CIO-DAS800, fixed ±5V SE

CIO-DAS802 $\pm 10V$, $\pm 5V$, $\pm 2.5V$, $\pm 1.25V$,

0 to 10V, 5V, 2.5V, 1.25V

CIO-DAS801 $\pm 10, \pm 5, \pm 1, \pm 0.5, \pm 0.1, \pm 0.05$

±0.01,±0.005

0 to 10V, 1V, 0.1V, 0.01V

Range selection Software programmable Bi/Unipolar select On-board switch (801/802) Max sample rate 50 KHz (using FIFO)

Greater than 10 Megohm

Digital I/0

Input Impedance

7-bits, 3 input, 4 output Digital specs TTL series (see page 271) Counter timers 3, 16-bit (8254 series)

Software Description

Includes InstaCal, installation, calibration and test software. Supported by the Universal Library programming language library. Also supported by SoftWIRE, DAS Wizard, HP VEE LAB and most third party, high-level data acquisition programs...

Channel Expansion and Signal Conditioning

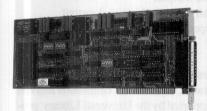
For more channels See CIO-EXP-series For isolated inputs For RTD or bridges

See ISO-RACK08 See EXP-GP, RTD

or BRIDGE16

Cables / Screw Terminal / Expansion Boards Screw terminal: C37FF-# / CIO-MINI37 or C37FF-# / SCB-37

IO-DAS08-AOH CIO-DAS08-AOM & CIO-DAS08-AOL



Features

- · 8 channel differential
- 12-bit, 20KHz A/D
- Dual 12-bit D/As
- 3 counters, 31 digital I/O
- · Software programmable input ranges

Analog Input Specifications

Input resolution 12-bits (1 in 4096) Input ranges:

-AOL $\pm 10V$, $\pm 5V$, $\pm 2.5V$, $\pm 1.25V$, $\pm .625V$ 0 to 10V, 5V, 2.5V, 1.25V

-AOM $\pm 10V$, $\pm 5V$, $\pm .5V$, $\pm .05V$, $\pm 0.1V$ 0 to 10V, 1V, 0.1V, 0.01V

-AOH $\pm 10V, \pm 5V, \pm 1V \pm .5V, \pm 0.1V, \pm 0.05V,$ $\pm .01V$, $\pm .005V$, 0 to 10V, 1V, 0.1V, 0.01V

Range selection Software programmable Max sample rate 20 KHz

Trigger/timing Int/ext clock and trigger

Analog Output Specifications

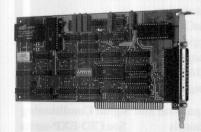
Channels 2, 12-bit resolution Output ranges $\pm 10V$, $\pm 5V$, $\pm 2.5V$, 0-10V, 0-5V, 0-2.5V Digital Input/Output (see pg 271 for family specs) Number of bits 24-bits CMOS, 3 banks of 8 7-bits TTL, 4 out, 3 in

Software Description

Includes InstaCal, installation, calibration and test software. Supported by the Universal Library programming language library. Also supported by SoftWIRE, DAS Wizard, HP VEE LAB and most third party, high-level data acquisition programs.

Cables / Screw Terminal / Acces. Boards Analog: C37FF-# / CIO-MINI37 or SCB-37 Digital: BP-40-37 & C37FF-#/CIO-MINI37 or BP-40-37 & C37FF-#/ SCB-37

CIO-DAS08-PGH. CIO-DAS08-PGM & CIO-DAS08-PGL



Features

- 8 channel differential
- 12-bit, 20KHz A/D
- 3 counters, 7 digital I/O
- · Software programmable input ranges

Analog Input Specifications

Input resolution 12-bits (1 in 4096) Input ranges:

-PGL ±10V, ±5V, ±2.5V, ±1.25V,±.625V 0 to 10V, 5V, 2.5V, 1.25V

-PGM $\pm 10V$, $\pm 5V$, $\pm .05V$, $\pm .05V$, $\pm 0.1V$ 0 to 10V, 1V, 0.1V, 0.01V

-PGH $\pm 10V, \pm 5V, \pm 1V \pm .5V, \pm 0.1V, \pm 0.05V$ $\pm .01V$, $\pm .005V$, 0 to 10V, 1V, 0.1V, 0.01V

Range selection Max sample rate Software programmable

20 KHz

Trigger/timing Int/ext clock and trigger

Digital Input/Output (see pg 271 for family specs) Number of bits 7-bits TTL, 4 out, 3 in

Software Description

Includes InstaCal, installation, calibration and test software. Supported by the Universal Library programming language library. Also supported by SoftWIRE, DAS Wizard, HP VEE LAB and most third party, high-level data acquisition programs..

Channel Expansion and Signal Conditioning The CIO-DAS08-PG series can be expanded using our EXP-series products, but for better results we recommned using a CIO-DAS800 series board when using our channel expansion boards.

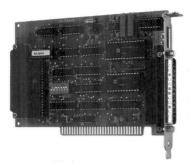
Cables / Screw Terminal / Acces. Boards Analog: C37FF-# / CIO-MINI37or SCB-37

DAS-8 FAMILY ANALOG I/O

For more channels

For isolated inputs

CIO-DAS08



Analog Input Specifications

Input resolution 12-bits (1 in 4096)

 $\pm 10V$, $\pm 5V$, 0-10V Input ranges: Range selection Switch selectable

Max sample rate 20 KHz

Trigger/timing Int/ext clock and trigger

Digital Input/Output (see pg 271 for family specs) 24-bits CMOS, 3 banks of 8 Number of bits

7-bits TTL, 4 out, 3 in

See EXP-GP, RTD For RTD or bridges or BRIDGE16

Channel Expansion and Signal Conditioning

See CIO-EXP-series

See ISO-RACK08

Cables / Screw Terminal / Expansion Boards Screw terminal: C37FF-# / CIO-MINI37 or C37FF-# / SCB-37

Features

Features

· 8 channel A/D

• 16-bit digital I/O

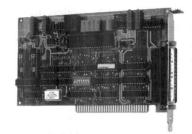
- · 8 channel single-ended
- 12-bit, 20KHz A/D
- 3 counters
- 31-bits of digital I/O

Software Description

Includes InstaCal, installation, calibration and test software. Supported by the Universal Library programming language library. Also supported by SoftWIRE, DAS Wizard, HP VEE LAB and most third party, high-level data acquisition programs.

All CIO-MINI series screw terminal boards are now available with detachable screw terminals. Simply add a /DST suffix to the CIO-MINI part number. See our price list for /DST pricing details.

CIO-DAS08/JR/16-AO & CIO-DAS08/JR/16



16-bit, 30 sample/sec A/D

• Dual 16-bit D/A (-AO version)

• Ideal education configuration

Analog Input Specifications Input resolution 16-bits (1 in 65536)

Input range ±5V

Max sample rate 30 samples per second

Analog Outputs (-AO version only)

Channels 2. 16-bit resolution

Output range $\pm 5V$

Digital Input/Output (see pg 271 for family specs) Number of bits 16-bits TTL, 8 in, 8 out

Options

The DAS08/JR/16 has no analog outputs, but may be upgraded to the DAS08/JR/16-AO by purchasing/installing the CIO-DUAL-DAC16 chip set.

Software Description

Includes InstaCal, installation, calibration and test software. Supported by the Universal Library programming language library. Also supported by SoftWIRE, DAS Wizard, HP VEE LAB and most third party, high-level data acquisition programs.

Teaching Tools

See the CIO-LAB8-TERM and computer interface course books shown on page 187.

Cables / Screw Terminal Boards Low cost mating connector kit: DFCON-37 Screw terminal: C37FF-# / CIO-MINI37

IO-DAS08/JR-AO & CIO-DAS08/JR



Features

- · 8 channel A/D
- 12-bit, 20 KHz A/D
- Dual 12-bit D/A (-AO version)
- 16-bit digital I/O
- · Ideal education configuration

Analog Input Specifications

Input resolution 12-bits (1 in 4096)

±5V Input range

Max sample rate 20 KHz

Analog Outputs (-AO version only)

Channels 2, 12-bit resolution

Output range $\pm 5V$

Digital Input/Output (see pg 271 for family specs) Number of bits 16-bits TTL, 8 in, 8 out

Options

The DAS08/JR has no analog outputs, but may be upgraded to the DAS08/JR-AO by purchasing/installing the CIO-DUAL-DAC chip set.

Software Description

Includes InstaCal, installation, calibration and test software. Supported by the Universal Library programming language library. Also supported by SoftWIRE, DAS Wizard, HP VEE LAB and most third party, high-level data acquisition programs.

Teaching Tools

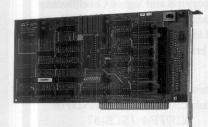
See the Data Lab Solution and computer interface course books.

Cables / Screw Terminal Boards

Low cost mating connector kit: DFCON-37 Screw terminal: C37FF-# / CIO-MINI37 or

C37FF-#/SCB-37

CIO-DAS48-PGA & CIO-DAS48-I



Features

- 48 channel single-ended or 24 channel differential
- 24 channel current input (-I ver)
- 12-bit, 20KHz A/D

Analog Input Specifications

Input resolution 12-bits (1 in 4096) Voltage Input ranges: (DAS48-PGA model)

 $\pm 10V$, $\pm 5V$, $\pm 2.5V$, $\pm 1.25V$, $\pm .625V$

0-10V, 0-5V, 0-2.5V, 0-1.25V

Current Input Ranges: (DAS48-I model)

0-20 mA, 4-20mA, 2-10mA, 1-5mA, .5-2.5mA

(full 3.9 uA / bit resolution on 4-20 range) Software programmable Gain selection

Uni/bipolar select on-board switch

Max sample rate 20 KHz SW polled mode

Input Impedances

Voltage input Greater than 10 Megohm

Current input 625 Ohms Digital I/0

none

Software Description

Includes InstaCal, installation, calibration and test software. Supported by the Universal Library programming language library. Also supported by SoftWIRE, DAS Wizard, HP VEE LAB and most third party, high-level data acquisition programs.

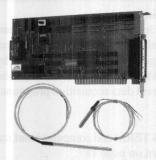
Cables / Screw Terminal Boards

Screw terminal: C50FF-# / CIO-MINI50 or

C50FF-#/SCB-50

Spade lug: C50FF-# / CIO-SPADE50

CIO-DAS-TEMP



Features

- 32 Temperature input channels
- 0.015°C Resolution (30 S/S)
- AD592 Compatible
- · Low cost

Temperature Input Specifications

Input resolution

30 samples/sec 0.015°C

25 samples/sec 0.0125°C 200 samples/sec 0.1°C

Input ranges

-45°C to 125°C

Board accuracy

±0.1°C

Software Description

Includes InstaCal, installation, calibration and test software. Supported by the Universal Library programming language library. Also supported by SoftWIRE, DAS Wizard, HP VEE LAB and most third party, high-level data acquisition programs.

SNSR-AD592-PRB1CN: 1 inch, stainless steel

temperature probe with 3 foot leads SNSR-AD592-PRB6CN: 6 inch, stainless steel

temperature probe with 3 foot leads

SNSR-AD592-TO2:

Plastic, TO2 style

temperature probe

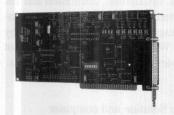
Probe accuracy

0 to 70°C -25 to 105°C 0.4°C typ, 0.8°C max 0.5°C typ, 1.0°C max

Cables / Screw Terminal C37FF-# / CIO-MINI37 or C37FF-# / SCB-37

Probes / Sensors

CIO-DAS-TC



Features

- 16 Thermocouple inputs
- J, K, E, T, R, S, B, support
- On-board processor converts input into °C or °F

Temperature Input Specifications

TC	Range	Resolution
J	-200 to +750 °C	± 0.1 °C
K	-200 to +1,250 °C	± 0.2 °C
E	-200 to +1,000 °C	± 0.1 °C
T	-200 to +400 °C	± 0.06 °C
R	0 to +1,768 °C	± 0.2 °C
S	0 to +1,450 °C	± 0.2 °C
В	+400 to +1,700 °C	± 0.2 °C
(the abo	ve resolutions are at 25 s	samples/sec)

Cold-junction error ± 0.5 °C at 25°C ± 1.2 °C 0 to 70°C

See our large selection of thermocouples starting on page 256.

Software Description

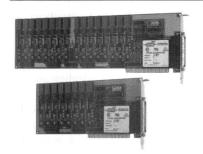
Includes InstaCal, installation, calibration and test software. Supported by the Universal Library programming language library. Also supported by SoftWIRE, DAS Wizard, HP VEE LAB and most third party, high-level data acquisition programs.

Cables / Screw Terminal Included!

The CIO-DAS-TC includes the CIO-TERM-TC providing an isothermal block and cold-junction sensor and a 5-foot shielded cable (C37FFS-5).

ISA Bus ANALOG OUTPUT BOARDS

CIO-DAC16/16 & CIO-DAC08/16



Features

- 8 channel CIO-DAC08/16
- 16 channel CIO-DAC16/16
- 16-bit resolution
- One D/A per channel
- · Power on reset

Analog Output Specifications

Channels 16, CIO-DAC16/16

8, CIO-DAC08/16

Configuration 1 independant D/A

per channel

Output resolution

16-bits (1 in 65536) ±10V, ±5V, 0-10V, 0-5V

Output ranges: Output current

±5 mA, min

Output resistance Short circ. current

<0.1 Ohm 40 mA min

Range selection

Switch selectable

Output settling (to 0.0008%)

10V step

6 uS typ, 9uS max 12 uS typ, 19 uS max

20V step Output updates

Independant or simultaneous

Shielded cable:

Standard:

C37FF-# / CIO-MINI37 or C37FF-# / SCB-37

Includes InstaCal, installation, calibration and test software. Supported by the Universal Library pro-

gramming language library. Also supported by

SoftWIRE, DAS Wizard, HP VEE LAB and most

third party, high-level data acquisition programs.

Software Description

C37FFS-# / CIO-MINI37 or

C37FFS-# / SCB-37

To add isolation to the outputs use our ISO-DA16 (please see page 183)

Cables / Screw Terminal Boards

CIO-DAC16 & CIO-DAC16-I





Features

- 16 D/A channels
- Voltage output CIO-DAC16
- Current output CIO-DAC16-I
- 12-bit resolution
- · One D/A per channel

General Output Specifications

Channels Configuration 16

1 independant D/A

per channel

Output resolution 12-bits (1 in 4096)

Voltage Output Specs: CIO-DAC16

Voltage ranges $\pm 10V, \pm 5V, \pm 2.5V$

0-10V, 0-5V, 0-2.5V

Output current

±5 mA, min < 0.1 Ohm

Output resistance Short circ. current

40 mA min

Range selection

Switch selectable

Output settling

5uS typ, 10uS max to .01%

Output updates Independant or simultaneous Current Output Specs: CIO-DAC16-I

Output range:

4-20 mA

Compliance voltage

8-36 V

Software Description

Includes InstaCal, installation, calibration and test software. Supported by the Universal Library programming language library. Also supported by SoftWIRE, DAS Wizard, HP VEE LAB and most third party, high-level data acquisition programs.

Cables / Screw Terminal Boards

Standard:

C37FF-# / CIO-MINI37 or

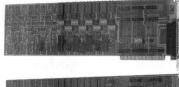
C37FF-# / SCB-37

Shielded cable:

C37FFS-# / CIO-MINI37 or

C37FFS-# / SCB-37

CIO-DAC08 & CIO-DAC08-I





Features

- 8 D/A channels
- Voltage output CIO-DAC08
- Current output CIO-DAC08-I
- 12-bit resolution
- One D/A per channel

General Output Specifications

Channels Configuration

1 independent D/A

per channel

Output resolution

12-bits (1 in 4096)

Output updates Independant or simultaneous

Voltage Output Specs: CIO-DAC08

Voltage ranges

 $\pm 10V, \pm 5V, \pm 2.5V$

Output current Output resistance 0-10V, 0-5V, 0-2.5V ±5 mA, min

Short circ. current

<0.1 Ohm 40 mA min

Range selection Output settling Output updates Switch selectable 5uS typ, 10uS max to .01%

Independant or simultaneous

Current Output Specs: CIO-DAC08-I

Output range: Compliance voltage 4-20 mA 8-36 V

Software Description

Includes InstaCal, installation, calibration and test software. Supported by the Universal Library programming language library. Also supported by SoftWIRE, DAS Wizard, HP VEE LAB and most third party, high-level data acquisition programs.

Cables / Screw Terminal Boards

Standard:

C37FF-# / CIO-MINI37 or

C37FF-# / SCB-37

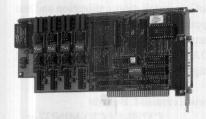
Shielded cable:

C37FFS-# / CIO-MINI37 or

C37FFS-# / SCB-37

For isolated outputs use our ISO-DA08 (pg 183)

CIO-DAC04/12-HS



Analog Output Specifications

Resolution 12-bits (1 in 4096) Configuration 1 D/A per channel $\pm 10V, \pm 5V, \pm 2.5V$ Output ranges: 0-10V, 0-5V, 0-2.5V

Range selection Switch selectable Output current ±5 mA, min Settling to .01% 1 uS typ, 1.5 uS max Max update rate 250KHz (total board throughput, must be

> divided among active D/A channels)

Timing Set by on-board 10 MHz

xtal/48-bit counter or via external trigger or clock

Output updates Independant or simultaneous

Digital Input/Output (see pg 271 for family specs) Number of bits 16-Bits TTL, 8 in, 8 out

Software Description

Includes InstaCal, installation, calibration and test software. Supported by the Universal Library programming language library. Also supported by SoftWIRE, DAS Wizard, HP VEE LAB and most third party, high-level data acquisition programs.

Cables / Screw Terminal Boards

Standard: C37FF-# / CIO-MINI37 or

C37FF-# / SCB-37

Shielded cable: C37FFS-# / CIO-MINI37 or

C37FFS-# / SCB-37

Features

Features

· 6 D/A channels · 16-bit resolution

One D/A per channel

24-Bits of digital I/O

· 4 Channel high speed D/A

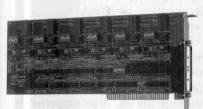
250 KHz update rates

12-Bit resolution

1024 Sample FIFO

16-bits of digital I/O

CIO-DDA06/16



Analog Output Specifications

Channels 6, 1 D/A per channel Output resolution 16-bits (1 in 65536) ±10V, ±5V, ±2.5V Output ranges: 0-10V, 0-5V

Output current Output resistance Short circ. current Range selection Output settling

(to 0.003%) Output updates ±5 mA, min <0.1 Ohm 40 mA min

Switch selectable

5 uS typ, 10uS max Independant or simultaneous

Digital Input/Output (see pg 271 for family specs)

Number of bits

24-bits CMOS (8255 series) 2 banks of 8, 2 of 4

Connector config. CIO-DIO24 compatible

Software Description

Includes InstaCal, installation, calibration and test software. Supported by the Universal Library programming language library. Also supported by SoftWIRE, DAS Wizard, HP VEE LAB and most third party, high-level data acquisition programs.

Cables / Screw Terminal Boards

C37FF-# / CIO-MINI37 or Standard:

C37FF-# / SCB-37

Shielded cable: C37FFS-# / CIO-MINI37 or

C37FFS-# / SCB-37

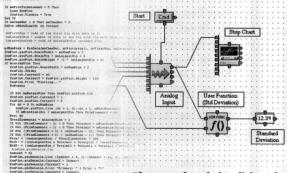
All CIO-MINI series screw terminal boards are now available with detachable screw terminals. Simply add a /DST suffix to the CIO-MINI part number. Please see the price list for pricing.



• 5 user selectable output ranges

Graphical Programming for Visual Basic

The power and flexibility of syntactical programming



The speed and simplicity of graphical programming

Introducing SoftWIRE™

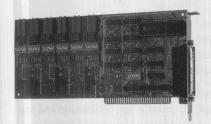
Graphical Programming in Visual Basic®

Syntactical programming has been around since the early days of computers. More recently, graphical programming languages have been introduced and are now a popular alternative to writing hard core, text-based syntax. What's been lacking is an easy way to combine the speed and ease of use of graphical programming with the flexibility and efficiency of writing code in an industry standard language. Until now—Introducing SoftWIRE.

> For more information on SoftWIRE, please see pages 6-10 in this catalog.

ISA Bus ANALOG OUTPUT BOARDS

CIO-DDA06



Features

- · 6 D/A channels
- 12-bit resolution
- 5 user selectable output ranges
- One D/A per channel
- 24-Bits of digital I/O

Analog Output Specifications

Channels

Configuration Output resolution

Output ranges:

1 D/A per channel 12-bits (1 in 4096)

±10V, ±5V, ±2.5V, ±1.67V

0-10V,0-5V,0-2.5V,0-1.67V

±5 mA, min

Output current Output resistance Short circ. current Range selection

<0.1 Ohm 40 mA min Switch selectable

Output settling (to 0.01%)

Output updates

5 uS typ, 10uS max Independant or simultaneous Digital Input/Output (see pg 271 for family specs) Number of bits

24-bits CMOS (8255 series)

2 banks of 8, 2 of 4 Connector config. CIO-DIO24 compatible

Software Description

Includes InstaCal, installation, calibration and test software. Supported by the Universal Library programming language library. Also supported by SoftWIRE, DAS Wizard, HP VEE LAB and most third party, high-level data acquisition programs.

Cables/Screw Terminal Boards

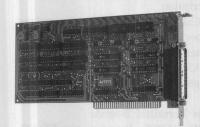
C37FF-# / CIO-MINI37 or Standard:

C37FF-# / SCB-37

Shielded cable: C37FFS-# / CIO-MINI37 or

C37FFS-# / SCB-37

CIO-DDA06/JR/16



Features

- 6 D/A channels (2 installed)
- 16-bit resolution
- One D/A per channel
- 24-Bits of digital I/O
- Power on reset to 0V

Analog Output Specifications

Channels Configuration Output resolution

up to 6 (2 installed) 1 D/A per channel 16-bits (1 in 65536) ±5V

±5 mA, min

Output ranges: Output current Output resistance Short circ. current

<0.1 Ohm 40 mA min Range selection Switch selectable

Output settling (to 0.003%) Output updates

5 uS typ, 10uS max Independant or simultaneous

For Additional Channels

CIO-DUAL-DAC/16 adds two channels

Digital Input/Output (see pg 271 for family specs)

Number of bits

24-bits STTL (8255 md 0) 2 banks of 8, 2 of 4

Connector config.

CIO-DIO24 compatible

Software Description

Includes InstaCal, installation, calibration and test software. Supported by the Universal Library programming language library. Also supported by SoftWIRE, DAS Wizard, HP VEE LAB and most third party, high-level data acquisition programs.

Cables / Screw Terminal Boards

Standard:

C37FF-# / CIO-MINI37 or

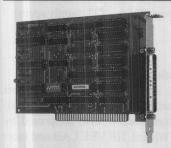
C37FF-# / SCB-37

Shielded cable:

C37FFS-# / CIO-MINI37 or

C37FFS-# / SCB-37

CIO-DDA06/JR



Features

- 6 D/A channels (2 installed)
- 12-bit resolution
- One D/A per channel
- 24-Bits of digital I/O

Analog Output Specifications

Channels Configuration up to 6 (2 installed) 1 D/A per channel 12-bits (1 in 4096)

Output resolution Output ranges:

Output resistance

(to 0.01%)

±5V ±5 mA, min <0.1 Ohm

Short circ. current Output settling

Output current

40 mA min

Output updates

5 uS typ, 10uS max Independant or simultaneous

For Additional Channels

CIO-DUAL-DAC adds two channels

Digital Input/Output (see pg 271 for family specs)

Number of bits

24-bits STTL (8255 md 0) 2 banks of 8, 2 of 4

Connector config. CIO-DIO24 compatible

Software Description

Includes InstaCal, installation, calibration and test software. Supported by the Universal Library programming language library. Also supported by SoftWIRE, DAS Wizard, HP VEE LAB and most third party, high-level data acquisition programs.

Cables/Screw Terminal Boards

Standard:

C37FF-# / CIO-MINI37 or

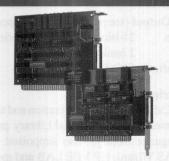
C37FF-# / SCB-37

Shielded cable:

C37FFS-# / CIO-MINI37 or

C37FFS-# / SCB-37

CIO-DAC02/16 & CIO-DAC02



Features

- 2 Analog outputs
- 12-Bit D/As (CIO-DAC02)
- 16-Bit D/As (CIO-DAC02/16)
- Power on reset (/16 model)

CIO-DAC02/16 Output Specifications

Output resolution 16-bits (1 in 65536) Output ranges: $\pm 10V$, $\pm 5V$, $\pm 2.5V$

0-10V, 0-5V, 0-2.5V

Output settling

(to 0.0008%) 12 uS typ, 19 uS max Range selection Switch selectable

CIO-DAC02 Output Specifications

Output resolution 12-bits (1 in 4096) Output ranges: $\pm 10V$, $\pm 5V$, 0-10V,

0-5V and 4-20 mA

Output settling

(to 0.01%) 150 uS typ, 230 uS max

General Specifications

Channels 2

Configuration 1 D/A per channel Output current ±5 mA, min

Output resistance <0.1 Ohm Short circ. current 40 mA min

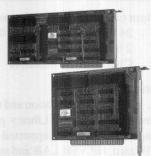
Software Description

Includes *Insta*Cal, installation, calibration and test software. Supported by the Universal Library programming language library. Also supported by SoftWIRE, DAS Wizard, HP VEE LAB and most third party, high-level data acquisition programs.

Cables / Screw Terminal Boards

Standard: C25FM-# / CIO-MINI25 For isolated outputs use our ISO-DA02 (pg 184)

CIO-CTR20HD, -CTR20HD/H50, -CTR10HD & -CTR10HD/H50



Features

- 20 16-Bit cntrs (CIO-CTR20)
- 10 16-Bit cntrs (CIO-CTR10)
- AMD 9513 based
- 1 MHz & 5 MHz on board XTAL oscillator source

Counter Specifications

Counters 20 CIO-CTR20

10 CIO-CTR10

Counter type AMD 9513

I/O levels/drives CMOS family (see pg. 271) Ext. input freq. range Up to 7 MHz

On-board freq source 1 MHz or 5 MHz XTAL stability Standard series 100 ppm

/H50 series 50 ppm

9513 Operating Modes

The 9513 is extremely powerful and flexible and may be configured for; event counting, pulse width measurement, frequency measurement, frequency division, generating complex duty cycles and much more. It supports one-shot and continuous modes.

Software Description

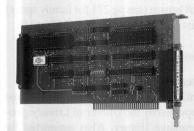
Includes *Insta*Cal, installation, calibration and test software. Supported by the Universal Library programming language library. Also supported by SoftWIRE, DAS Wizard, HP VEE LAB and most third party, high-level data acquisition programs.

Cables / Screw Terminal Boards

CIO-CTR20HD (&H/50): Requires two C50FF-#cables and one SCB-50 (or two CIO-MINI50) screw terminal board(s).

CIO-CTR10 (&H/50): C50FF-# cable with CIO-MINI50 or SCB-50 screw terminal adaptors.

CIO-CTR10 & CIO-CTR10/H50



Specifications

Counters 10, 16-bit Counter type AMD 9513

I/O levels/drives CMOS family (see pg. 270)

Ext. input freq. range Up to 7 MHz
On-board XTAL 1 MHz

XTAL stability Standard series 100 ppm

/H50 series 50 ppm

9513 Operating Modes

The 9513 is extremely powerful and flexible and may be configured for; event counting, pulse width measurement, frequency measurement, frequency division, generating complex duty cycles and much more. It supports one-shot and continuous modes.

Digital I/O (see page 271 for TTL family specs)

Input 16-Bits, TTL family Output 16-Bits, TTL family

Software Description

Includes *Insta*Cal, installation, calibration and test software. Supported by the Universal Library programming language library. Also supported by SoftWIRE, DAS Wizard, HP VEE LAB and most third party, high-level data acquisition programs.

Cables / Screw Terminal Boards

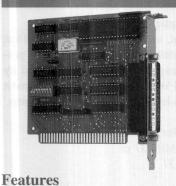
Two each of C37FF-# / CIO-MINI37 or Two C37FF-# and one SCB-37

Features

- Ten 16-Bit counters
- AMD 9513 based
- 1 MHz XTAL oscillator
- 16-Bits digital input
- 16-Bits digital output

ISA Bus COUNTERS & TIMERS

CIO-CTR05 & CIO-CTR05/H50



Specifications

Counters 5, 16-bit Counter type AMD 9513

I/O levels/drives CMOS family (see pg. 271) Ext. input freq. range Up to 7 MHz

On-board XTAL 1 MHz

XTAL stability Standard series 100 ppm /H50 series 50 ppm

9513 Operating Modes

The 9513 is extremely powerful and flexible and may be configured for; event counting, pulse width measurement, frequency measurement, frequency division, generating complex duty cycles and much more. It supports one-shot and continuous modes.

Digital I/O (see page 271 for TTL family specs)

Input 8-Bits, TTL family
Output 8-Bits, TTL family

Software Description

Includes *InstaCal*, installation, calibration and test software. Supported by the Universal Library programming language library. Also supported by SoftWIRE, DAS Wizard, HP VEE LAB and most third party, high-level data acquisition programs.

Cables / Screw Terminal Boards

C37FF-# / CIO-MINI37 or C37FF-# / SCB-37

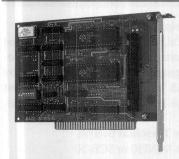
• 8-Bits digital output CIO-INT32

• Five 16-Bit Counters

AMD 9513 Based

8-Bits digital input

1 MHz XTAL oscillator



Functional Description

The CIO-INT32 is possibly the most powerful digital I/O accessory available for the personal computer. The heart of the CIO-INT32 is a pair or Zilog Z8536 programmable digital I/O chips.

Z8536 Programming modes

Digital I/0 20-bit, independently set for in-

put/output, 2 or 3 wire hand shaking supported

Counters 3 counters set up independently

or chained together internally.

32 Vector Interrupt

The Z8536 can accept 16 independent external interrupts, and output an interrupt to the PC. The output from the two Z8536s may be ANDed by an on board jumper.

Software Description

Includes *Insta*Cal, installation, calibration and test software. Supported by the Universal Library programming language library. Also supported by SoftWIRE, DAS Wizard, HP VEE LAB and most third party, high-level data acquisition programs.

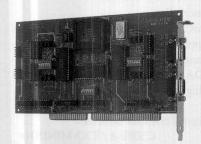
Cables / Screw Terminal Boards

C50FF-# / CIO-MINI50 or C50FF-# / SCB-50

Features

- 32 Vector, interupt director
- Digital pattern recognition
- 40-Bits of digital I/O
- Six 16-bit counters
- Very low cost

CIO-QUAD4 & CIO-QUAD2



Specifications

Encoders Four (CIO-QUAD4)
Two (CIO-QUAD2)
Type Single-ended or
differential

Common mode range ±12 V
Input sensitivity ±200 mV
Hysteresis ±50 mV
Input impedance 12 KOhm

Software Description

Includes *Insta*Cal, installation, calibration and test software. Supported by the Universal Library programming language library. Also supported by SoftWIRE, DAS Wizard, HP VEE LAB and most third party, high-level data acquisition programs.

I/O Connections/Pinout

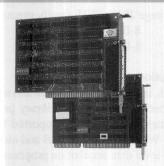
9-pin D connectors (two channels per connector)

1: A- 4: +5V 7: B+
2: +5V 5: Index- 8: Gnd
3: B- 6: A+ 9: Index+

Features

- Four quadrature/incremental encoder inputs
- 24-Bit presettable counters
- 1.25 MHz input pulse rate

CIO-PDMA32 & CIO-PDMA16



Features

- · High speed digital I/O
- 750 Kiloword/S CIO-PDMA32
- 125 Kiloword/S CIO-PDMA16
- · On-board counter for pacing

Specifications

I/O bits 16
Logic family TTL
Data transfer rates (via DMA)

CIO-PDMA32 200 KWord, DMA mode

750 KWord, with FIFO

and Rep Insw mode

CIO-PDMA16 125 KWord, 250 KByte Handshaking Xfer Ack & Xfer Req

bits are supported

Counter/timer Three 16-bit (8254)
Other I/O bits 3 Aux TTL level output

bits are provided

Triggering External or Internal

Software Description

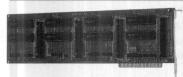
Includes *Insta*Cal, installation, calibration and test software. Supported by the Universal Library programming language library. Also supported by SoftWIRE, DAS Wizard, HP VEE LAB and most third party, high-level data acquisition programs.

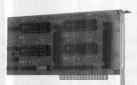
Cables / Screw Terminal Boards C37FF-# / CIO-MINI37 or

C37FF-# / SCB-37

All CIO-MINI series screw terminal boards are now available with detachable screw terminals. Simply add a /DST suffix to the CIO-MINI part number. See our price list for /DST pricing details.

CIO-DIO192 & CIO-DIO96





Features

- 192 Digital I/O bits through eight 82C55 chips (DIO192)
- 96 Digital I/O bits through four 82C55 chips (DIO96)

Digital I/0 Specifications

I/O bits 192 (DIO192)

96 (DIO96)

Configuration Eight 82C55 chips (DIO192)

Four 82C55 chips (DIO96)

82C55 Specifications

Logic family

I/O bits 24 divided into two 8-bit

and two 4-bit ports. Each port

can be set as input or output. CMOS (see pg. 271 for CMOS

family information)

Software Description

Includes *Insta*Cal, installation, calibration and test software. Supported by the Universal Library programming language library. Also supported by SoftWIRE, DAS Wizard, HP VEE LAB and most third party, high-level data acquisition programs.

Cables / Screw Terminal Boards C50FF-# / CIO-MINI50 or SCB-50

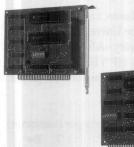
CIO-DIO192 requires 4 C50FF-# series cables plus four CIO-MIN50 or two SCB-50

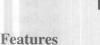
CIO-DIO96 requires 2 C50FF-# series cables plus two CIO-MIN50 or one SCB-50

Compatible Accessory Boards

Solid-state relays: SSR-RACK series Electromechanical relays: CIO-ERB series

CIO-DIO48 & CIO-DIO24





- 48 Digital I/O bits through two 82C55 chips (DIO48)
- 24 Digital I/O bits through one 82C55 chip (DIO24)

Digital I/0 Specifications

I/O bits 48 (DIO48) 24 (DIO24)

Configuration Two 82C55 chips (DIO48)

One 82C55 chip (DIO24)

82C55 Specifications

Logic family

I/O bits 24 divided into two 8-bit

and two 4-bit ports. Each port can be set as input or output. CMOS (see pg. 271 for CMOS

family information)

Compatible Accessory Boards
Solid-state relays: SSR-RACK series
Electromechanical relays: CIO-ERB series

Software Description

Includes *Insta*Cal, installation, calibration and test software. Supported by the Universal Library programming language library. Also supported by SoftWIRE, DAS Wizard, HP VEE LAB and most third party, high-level data acquisition programs.

Cables / Screw Terminal Boards

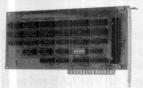
CIO-DIO48: C50FF-# / CIO-MINI50 or

C50FF-# / SCB-50

CIO-DIO24: C37FF-# / CIO-MINI37 or

C37FF-# / SCB-37

CIO-DIO48H & CIO-DIO24H





Digital I/O Specifications

I/O bits 48 (DIO48H) 24 (DIO24H)

Configuration 24 I/O bits divided into two

8-bit and two 4-bit ports. Emulates 8255 mode 0

Input specs TTL family (see pg. 271)

Output specs STTL family

Sink 64 mA min. at 0.55 V max. Source 15 mA min at 2.5 V min **Software Description**

Includes *Insta*Cal, installation, calibration and test software. Supported by the Universal Library programming language library. Also supported by SoftWIRE, DAS Wizard, HP VEE LAB and most third party, high-level data acquisition programs.

Cables / Screw Terminal Boards

CIO-DIO48H: C50FF-# / CIO-MINI50 or

C50FF-# / SCB-50

Compatible Accessory Boards

Solid-state relays: SSR-RACK series Electromechanical relays: CIO-ERB series

CIO-DIO24H: C37FF-# / CIO-MINI37 or

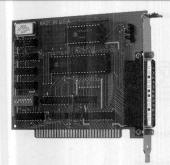
C37FF-# / SCB-37

CIO-DIO24/CTR3

• 48 Digital I/O bits, (DIO48H)

• 24 Digital I/O bits (DIO24H)

• Emulates 8255 mode 0



Digital I/O Specifications

Configuration One 8255 chip I/O bits 24 divided into two

24 divided into two 8-bit and two 4-bit ports. Each port can be set as input or output.

Logic family CMOS (see pg. 271 for CMOS

family information)

Counter/Timer

Configuration One 82C54 chip
Counters Three 16-bit down counters

with gate

Counter source Internal or external

On-board clock 10 MHz crystal controlled Logic family CMOS (see pg. 271 for CMOS

family information)

Software Description

Includes *Insta*Cal, installation, calibration and test software. Supported by the Universal Library programming language library. Also supported by SoftWIRE, DAS Wizard, HP VEE LAB and most third party, high-level data acquisition programs.

Compatible Accessory Boards

Solid-state relays: SSR-RACK series Electromechanical relays: CIO-ERB series

Cables / Screw Terminal Boards . C37FF-# / CIO-MINI37 or SCB-37

This cable/terminal board system provides connections to all digital I/O, counter timer

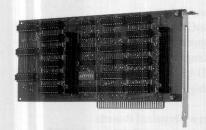
signals, +5V and return

Features

Features

- 24-Bits of digital I/O (8255)
- Three 16-bit counters (8254)
- On-board 10 MHz crystal oscillator

CIO-DUAL-AC5



Digital I/O Specifications I/O bits 48

Configuration 24 I/O bits divided into two

8-bit and two 4-bit ports. Emulates 8255 mode 0 TTL family (see pg. 271)

Input specs
Output specs

Sink 64 mA min. at 0.55 V max. Source 15 mA min at 2.5 V min **Software Description**

Includes *InstaCal*, installation, calibration and test software. Supported by the Universal Library programming language library. Also supported by SoftWIRE, DAS Wizard, HP VEE LAB and most third party, high-level data acquisition programs..

Cables / Interconnections

For use with PB24 use: C50FE-# cable (see the PB24 board on page 176)

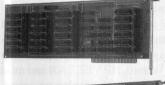
For screw terminal connections use C50FF-# cable and CIO-MINI50 or SCB-50 screw term. adaptors.

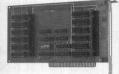
Features

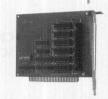
- Directly OPTO/GORDOS AC5/PB24 compatible
- High current (64mA) outputs
- Controls 2 PB24 racks

SSR-PB24 on page 176)

CIO-DI192, CIO-DI96 & CIO-DI48







Features

- 192 Digital inputs (CIO-DI192)
- 96 Digital inputs (CIO-DI96)
- 48 Digital inputs (CIO-DI48)

Digital Input Specifications

I/O bits 192 (DI192)

96 (DI96)

48 (DI48)

Configuration 8-Bit ports

Logic Levels TTL (see pg. 271 for family information)

Compatible Accessory Boards

Solid-state relays: CIO-SSR-RACK series

Software Description

Includes *Insta*Cal, installation, calibration and test software. Supported by the Universal Library programming language library. Also supported by SoftWIRE, DAS Wizard, HP VEE LAB and most third party, high-level data acquisition programs.

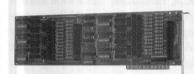
Cables / Screw Terminal Boards

CIO-DI192 requires 4 C50FF-# series cables plus four CIO-MIN50 or two SCB-50

CIO-DI96 requires 2 C50FF-# series cables plus two CIO-MIN50 or one SCB-50

CIO-DI48 requires 1 C50FF-# series cables plus one CIO-MIN50 or one SCB-50

CIO-DISO48



Features

- 48 Digital Input bits
- 0-28 VAC/VDC input (/H)
- 500V Isolation
- · AC or DC input

Digital I/O Specifications

I/O channels

Input low

48

Configuration six 8-bit ports
Input isolation 500 V, channe

500 V, channel to channel and channel to ground

2.0 VDC/VAC max

Input high 5 VDC/VAC min

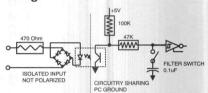
Input range 0 to 28 VDC/VAC

AC Freq. Range 50-1000 Hz

Cables / Screw Terminal Boards

C50FF-# and two CIO-MINI50 or C50FF-# and one SCB-50

Input Configuration

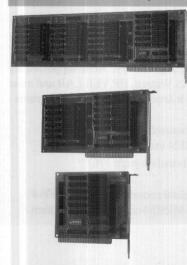


Input Resistor is 1.3 KOhm on new boards

Software Description

Includes *Insta*Cal, installation, calibration and test software. Supported by the Universal Library programming language library. Also supported by SoftWIRE, DAS Wizard, HP VEE LAB and most third party, high-level data acquisition programs.

CIO-DO192H, CIO-DO96H & CIO-DO48H



Features

- 192 Digital outputs (CIO-DO192H)
- 96 Digital outputs (CIO-DO96H)
- 48 Digital outputs (CIO-DO48H)
- High current (64 mA sink, 15 mA source)

Digital Output Specifications

I/O bits 192 (CIO-DO192H)

96 (CIO-DO96H)

48 (CIO-DO48H)

Output specs (STTL series)

Sink 64 mA min. at 0.55 V max. Source 15 mA min at 2.5 V min

Compatible Accessory Boards

Solid-state relays: SSR-RACK series Electromechanical relays: CIO-ERB series

Software Description

Includes *Insta*Cal, installation, calibration and test software. Supported by the Universal Library programming language library. Also supported by SoftWIRE, DAS Wizard, HP VEE LAB and most third party, high-level data acquisition programs.

Cables / Screw Terminal Boards CIO-DO192 requires 4 C50FF-# series cables plus four CIO-MIN50 or two SCB-50

CIO-DO96 requires 2 C50FF-# series cables plus two CIO-MIN50 or one SCB-50

CIO-DO48 requires 1 C50FF-# series cables plus one CIO-MIN50 or one SCB-50

- · 500 mA sink currents
- 50 VDC maximum switching
- · Open collector outputs

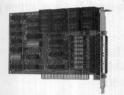
CIO-DO24DD:

C50FF-# / CIO-MINI50 or

C50FF-# / SCB-50

CIO-PDISO16 & CIO-PDISO8





Features

 CIO-PDISO16: 16 relays and 16 isolated inputs

 CIO-PDISO8: 8 relays and 8 isolated inputs **Specifications**

Relays PDISO16: 16 Form C

PDISO8: 5 Form C, 3 Form A NO

Contact rating 28VDC@3A,

120VAC@3A

Contact type Gold overlay silver
Contact resistance 100 mOhms max

Life 100 Million operations, min

Isolated inputs: 8 or 16

Type Opto-isolated, non-polarized.

Isolation 500V Chan-to-Chan & Channel-to-Ground

Input Range 5-28VDCorAC50-1000Hz

Input Impedance 1.6K Ohms Min

Software Description

Includes *Insta*Cal, installation, calibration and test software. Supported by the Universal Library programming language library. Also supported by SoftWIRE, DAS Wizard, HP VEE LAB and most third party, high-level data acquisition programs.

Cables / Screw Terminal Boards

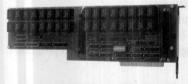
CIO-PDISO16:

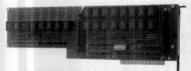
2 each of the C50FF-# / CIO-MINI50 or 2 C50FF-# cables and one SCB-50

CIO-PDISO8:

C37FF-# / CIO-MINI37 or C37FF-# / SCB-37

CIO-RELAY32 & CIO-RELAY24





Specifications

Relays RELAY32: 32 Form C (SPDT)

RELAY24: 24 Form C (SPDT)

Contact rating 28VDC @ 3A,

120VAC@3A

Contact type Gold overlay silver
Contact resistance 100 mOhms max

Operating time 20 mSec Release time 10 mSec

Life 100 Million operations, min

Software Description

Includes *Insta*Cal, installation, calibration and test software. Supported by the Universal Library programming language library. Also supported by SoftWIRE, DAS Wizard, HP VEE LAB and most third party, high-level data acquisition programs.

Cables / Screw Terminal Boards

CIO-RELAY32:

2 each of the C50FF-# / CIO-MINI50 or 2 C50FF-# cables and one SCB-50

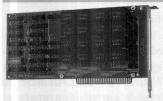
CIO-RELAY24:

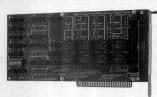
2 each of the C50FF-# / CIO-MINI50 or 2 C50FF-# cables and one SCB-50

Features

- 32 Form C relays (RELAY32)
- 24 Form C relays (RELAY24)

CIO-RELAY16 & CIO-RELAY08





Specifications

Relays RELAY16: 16 Form C (SPDT)

RELAY08: 8 Form C (SPDT)

Contact rating 28VDC@3A,

120VAC@3A

Contact type Contact resistance 100mOhmsmax

Gold overlay silver

Operating time Release time

20mSec 10mSec

Life 100 Million operations, min **Software Description**

Includes InstaCal, installation, calibration and test software. Supported by the Universal Library programming language library. Also supported by SoftWIRE, DAS Wizard, HP VEE LAB and most third party, high-level data acquisition programs...

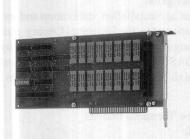
Cables / Screw Terminal Boards C50FF-# / CIO-MINI50 or C50FF-# / SCB-50

All CIO-MINI series screw terminal boards are now available with detachable screw terminals. Simply add a /DST suffix to the CIO-MINI part number. See our price list for /DST pricing details.

Features

- 16 Form C relays (RELAY16)
- 8 Form C relays (RELAY08)

CIO-RELAY16/M



Specifications

Relays

Contact rating

16FormC(SPDT) 2A@250VDC 1A@240VAC

Contact type

Mercury wetted Position sensitivity Must be mounted within

30 degrees of vertical

Contact resistance 50mOhmsmax

Operating time Release time

Life

2mSec

2mSec

50 Million operations

at rated load

1 Billion operations at

low load

Software Description

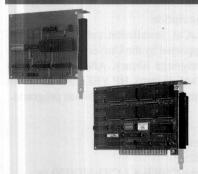
Includes InstaCal, installation, calibration and test software. Supported by the Universal Library programming language library. Also supported by SoftWIRE, DAS Wizard, HP VEE LAB and most third party, high-level data acquisition programs.

Cables / Screw Terminal Boards C50FF-# / CIO-MINI50 or C50FF-# / SCB-50

Features

- 16 Form A relays
- · Mercury wetted contacts

CB-DIO96 & NICB-DIO24



Digital I/0 Specifications

I/O bits 96 (DIO96) 24 (DIO24)

Configuration Four 82C55 chips (DIO96)

One 82C55 chips (DIO24)

Software Description

Designed for use with your existing software and manual. The boards are also supported by many

82C55 Specifications

I/O bits 24 divided into two 8-bit

> and two 4-bit ports. Each port can be set as input or output.

Logic family CMOS (see pg. 271 for CMOS

family information)

third party, high-level data acquisition programs.

Cables / Screw Terminal Boards NICB-DIO96: C100FF-# / SCB-50

This cable/terminal board provides connections for all 96-bits of digital I/O, +5V and return.

NICB-DIO24:

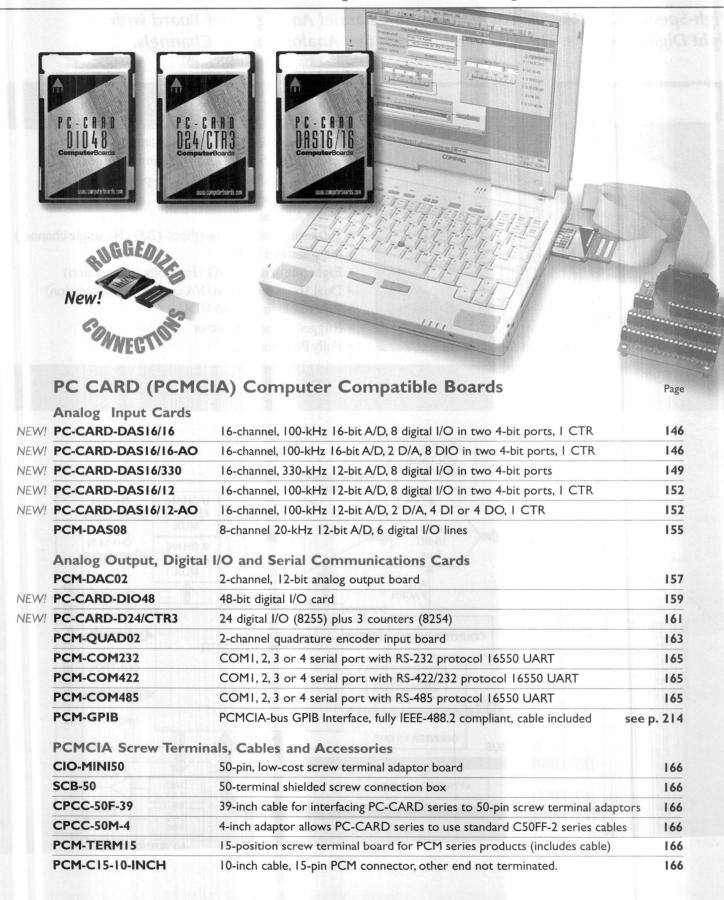
C50FF-# / CIO-MINI50 or C50FF-# / SCB-50

Features

- National InstrumentsTM compatible digital I/O boards
- Hardware and software compatible

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PC CARD (PCMCIA) Interfaces



PC-CARD-DAS16/16 & /16-AO

High-Speed PCMCIA-bus Compatible, 16-Channel Analog Input Board with Eight Digital I/O bits. The -AO version adds two Analog Output Channels.

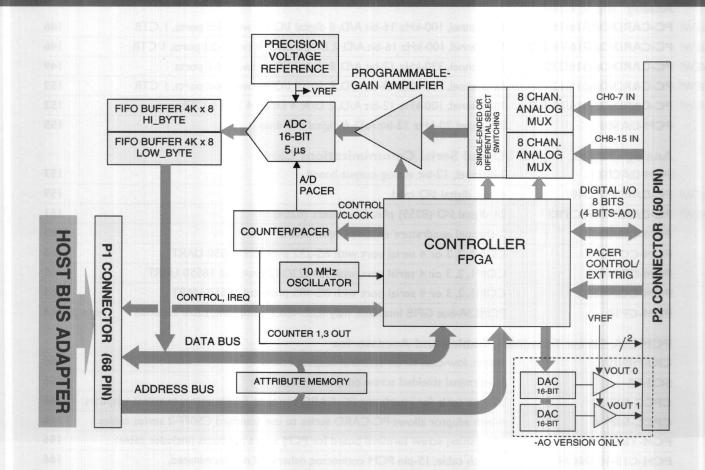




Features

- 16 single-ended or 8 differential analog inputs
- ± 10 , ± 5 , ± 2.5 and ± 1.25 VDC input ranges
- On-board, external, or software-polled A/D pacing
- Burst mode support
- 16-bit A/D resolution
- 100 k samples/sec throughput (200 kHz single channel)
- 4096 sample FIFO
- Eight bits of digital I/O (Four bits -AO version)
- Dual 16-bit resolution D/A channels (-AO version)
- Resettable fuse on +5 VDC
- Rugged 50-pin connector
- Fully Plug-and-Play

Block Diagram



The PC-CARD-DAS16/16 and PC-CARD-DAS16/16-AO are data acquisition and control boards for PC-CARD/PCMCIA compatible computers with type 2 slots. The board offers 16-bit A/D resolution and provides 8 differential or 16 single-ended inputs in 4 bipolar input ranges. Input configuration is software selectable.

Sample timing is set by an on-board crystal controlled pacer, an external pacer/trigger input (level or edge triggered), or by software polling. The board also allows a burst-mode emulation of a simultaneous sample and hold. Single channels may be sampled as high as 200 ksamples per sec while multi-channel scans are capable of 100 kHz

Data transfers are made by software polling, a selected interrupt service or REP-INSW. A 4k FIFO buffer provides buffering between the A/D circuit and the PCMCIA bus. Half-full interrupts from the FIFO assures that no samples are lost.

I/O Connector

All I/O signals pass through a 50-pin high-density connector.

Differential Analog Inputs

Pin	Signal Name	Pin	Signal Name
1	AGND	26	DGND
2	CH0 HI	27	DIO0
3	CH0 LO	28	DIO1
4	CH1 HI	29	DIO2
5	CH1 LO	30	DIO3
6	CH2 HI	31	DIO4 (n/c on -AO)
7	CH2 LO	32	DIO5 (n/c on -AO)
8	CH3 HI	33	DIO6 (n/c on -AO)
9	CH3 LO	34	DIO7 (n/c on -AO)
10	CH4 HI	35	DAGND0 (-AO only)
11	CH4 LO	36	VOUT0 (-AO only)
12	CH5 HI	37	DAGND1 (-AO only)
13	CH5 LO	38	VOUT1 (-AO only)
14	СН6 НІ	39	CTR1_CLOCK
15	CH6 LO	40	CTR1_GATE
16	CH7 HI	41	CTR1_OUT
17	CH7 LO	42	A/D_EXTERNAL PACER
18	AGND	43	EXTERNAL INTERRUPT
19	n/c	44	A/D_PACER GATE
20	n/c	45	A/D_EXTERNAL TRIGGER
21	n/c	46	n/c
22	n/c	47	A/D_PACER OUT
23	n/c	48	VDD
24	n/c	49	n/c
25	n/c	50	DGND

Single-Ended Analog Inputs

Pin	Signal Name	Pin	Signal Name
1	AGND	26	DGND
2	CH0 IN	27	DIO0
3	CH8 IN	28	DIO1
4	CH1 IN	29	DIO2
5	CH9 IN	30	DIO3
6	CH2 IN	31	DIO4 (n/c on -AO)
7	CH10 IN	32	DIO5 (n/c on -AO)
8	CH3 IN	33	DIO6 (n/c on -AO)
9	CH11 IN	34	DIO7 (n/c on -AO)
10	CH4 IN	35	DAGND0 (-AO only)
11	CH12 IN	36	VOUT0 (-AO only)
12	CH5 IN	37	DAGND1 (-AO only)
13	CH13 IN	38	VOUT1 (-AO only)
14	CH6 IN	39	CTR1_CLOCK
15	CH14 IN	40	CTR1_GATE
16	CH7 IN	41	CTR1_OUT
17	CH15 IN	42	A/D_EXTERNAL_PACER
18	AGND	43	EXTERNAL INTERRUPT
19	n/c	44	A/D_PACER GATE
20	n/c	45	A/D_EXTERNAL TRIGGER
21	n/c	46	n/c
22	n/c	47	A/D_PACER_OUT
23	n/c	48	VDD
24	n/c	49	n/c
25	n/c	50	DGND

The PC-CARD-DAS16/16 provides eight digital I/O lines (eight in or out, or, four in, four out) and allows the user to sense and control a wide variety of discrete events.

The PC-CARD-DAS16/16-AO version includes dual digital-to-analog converters and provides two accurate, highly stable analog outputs in two programmable ranges. Double buffering of the two outputs permits simultaneous outputting. Adding the analog output capability reduces digital I/O capacity to four I/O lines (four in or four out).

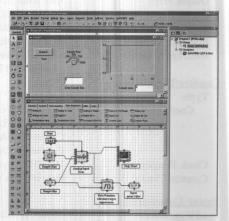
The PC-CARD-DAS16/16 is completely plug-and-play. There are no switches, jumpers or potentiometers on the board. All board addresses, interrupt channels etc. are set by your computers plug-and-play software. Gain/offset calibration is performed in software after reading a precision reference voltage/ground applied to the A/D converter by software command.

Software

The PC-CARD-DAS16/16 comes with ComputerBoards' powerful *Insta*CalTM software package. *Insta*Cal is a complete installation, calibration and test program for ComputerBoards data acquisition and control boards. Complete with extensive error checking, *Insta*Cal guides you through installation and setup of your data acquisition board and creates the board configuration file for use by your program or application software package. *Insta*Cal is described in detail in the Software Installation Manual.

The PC-CARD-DAS16/16 is fully supported by ComputerBoards' powerful Universal Library. Universal Library is a complete set of I/O libraries and drivers for all of our boards, in all Windows based languages. When using the Universal Library you can switch boards or even programming languages and the syntax remains constant. For details on Universal Library, please refer to the Universal Library Manual.

The PC-CARD-DAS16/16 is fully supported by a wide variety of applications software packages including SoftWIRE™, DAS-Wizard™, (and DAS-Wizard Pro™), HP VEE®, HP VEE Lab and LabVIEW™. For further details on these, as well as a variety of other software packages, please refer to the software section provided earlier in this catalog.



SoftWIRE for Visual Basic combines the simplicity of graphical programming with the power and flexibility of programming in VB!

Performance Specifications

Analog Input

A/D Converter type ADS 7805 Resolution 16 bits A/D Gain drift ±410 ppm/°C ±305 ppm/°C Zero Drift A/D Conversion Time 5 µs

±1.5 LSB max Integral nonlinearity Differential nonlinearity ±1.5 LSB max

Relative Accuracy ±2 LSB (Software Calibrated)

Throughput

(Post-process Calibration) 100 kHz multi-channel 200 kHz single channel

Burst Mode Transfer Rate

Number of channels 8 differential or 16 single-ended Input Ranges $\pm 10V$, $\pm 5V$, $\pm 2.5V$, , ± 1.25 , or Each channel independently

programmable.

Data transfer modes REP-INSW, interrupt, or software polled.

100 kHz

Common Mode Range ±10V CMRR @ 60 Hz -76bD Maximum Input Voltage +55V, -40V

Analog Output - PC-CARD-DAS16/16-AO Only

D/A Converter type LTC1655 Resolution 16 bits

Number of Channels Two single-ended voltage outputs ±5V, ±10V, independently programmable Ranges

Current Drive ±2 mA Gain Error ±1 LSB Offset Error ±1 LSB

Ouput short-circuit Indefinite @ 12 mA

Buffers Double buffered output latches permit updating DACs simultaneously

Digital Section

Digital Type **FPGA**

Number of channels

PC-CARD-DAS16/16 2 ports of 4 bits programmable

by port as 4 inputs or 4 outputs per port

PC-CARD-DAS16/16-AO 1 Port, 4 bits (4 inputs or 4 outputs) Input High 2.0 Volts min, (5.5 Volts absolute max) Input Low 0.8 Volts max, (-0.5 volts absolute min)

Output High 3.86 Volts (IOH = -4 mA)Output Low 0.5 Volts (IOL = 4 mA)Interrupts Programmable: levels 2 to 15

Interrupt Enable Programmable

Interrupt Sources End-of-Conversion, FIFO Half-full,

external (Ext Int)

Counter/Pacer

Type

Configuration Three down-counters, 16 bits each Counter 1 - User-controlled Counter 2 - ADC Lower Divider

Counter 3 - ADC Upper Divider & User

Clock Frequency 10 MHz Crystal-Controlled

Counter Clocks Ext, 100kHz (1), 1 MHz, or 10 MHz (2)

Power Consumption

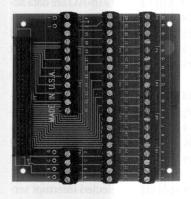
+5V quiescent 65 mA typical, 90 mA maximum +5V CIS read 75 mA typical, 110 mA maximum

Environmental

0 to 70°C Operating temp range -40 to 100°C Storage temp range

Humidity 0 to 90% non-condensing

Screw Terminal Accessories



CIO-MINI50* Low cost, 50-pin, screw terminal board brings all 50 conductors from PC-CARD-DAS board out to easy to use screw terminals. Requires a CPCC-50 series cable. For standard applications use the CPCC-50F-39 one meter cable. If your application requires a cable length other than one meter use the CPCC-50M-4(4 inches long) and a C50FF-XX series cable in the length desired.

SCB-50 High quality, shielded 50-pin, screw terminal connection box allows you to make your connections in a rugged, shielded enclosure. Requires a CPCC-50 series cable. For standard applications use the CPCC-50F-39 one meter cable. If your application requires a cable length other than one meter use the CPCC-50M-4(4 inches long) and a C50FF-XX series cable in the length desired



*CIO-MIN50 is available with detachable screw terminals. Please see part#CIO-MINI50/DST.

Ordering Guide

PC-CARD-DAS16/16

16-chan SE/8-chan Diff analog input board with 8 digital I/O bits and three counter/timers.

PC-CARD-DAS16/16-AO

16-chan SE/8-chan Diff analog input board with 8 digital I/O bits, two analog ouputs and three counter/timers.

CPCC-50F-39

CPCC-50M-4 C50FF-XX

CIO-MINI50*

SCB-50

One-meter Cable, (or)

4-inch Adapter Cable (and) Cable ordered to desired length

50-pin, screw terminal board

Shielded 50-pin, screw terminal connection box

PC-CARD-DAS16/330

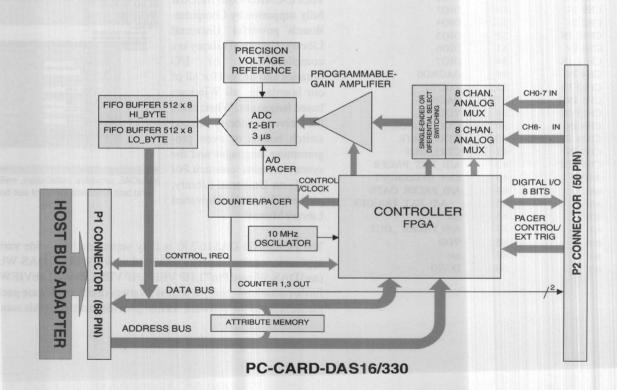
Ultra High-Speed PCMCIA-bus Compatible, 16-Channel Analog Input Board with Eight Digital I/O bits.



Features

- · 16 single-ended analog inputs
- ±5 VDC, ±10 VDC input ranges
- On-board, external, or software-polled A/D pacing
- 12-bit A/D resolution
- 330 k samples/sec throughput (3 µs conversion).
- 512 sample FIFO
- Eight bits of digital I/O
- Resettable fuse on +5 VDC
- Rugged 50-pin connector
- Fully Plug-and-Play

Block Diagram



The PC-CARD-DAS16/330 is a high performance data acquisition and control board for PC-CARD/PCMCIA compatible computers with type 2 slots. The board offers 12-bit A/D resolution and provides 16 single-ended inputs with ± 10 VDC and ± 5 VDC input ranges. Input configuration is software selectable.

Sample timing is set by an on-board crystal controlled pacer, an external pacer/trigger input (level or edge triggered), or by software polling. The maximum sample rate is 330 ksamples per second.

Data transfers are made by software polling, a selected interrupt service or REP-INSW. A 512 byte FIFO buffer provides buffering between the A/D circuit and the PCMCIA bus. Half-full signaling from the FIFO permits simultaneous loading and unloading of the FIFO and assures that no samples are lost.

I/O Connector

All I/O signals pass through a 50-pin high-density connector.

Single-Ended Analog Inputs

Pin	Signal Name	Pin	Signal Name
1	AGND	26	DGND
2	CH0 IN	27	DIO0
3	CH8 IN	28	DIO1
4	CH1 IN	29	DIO2
5	CH9 IN	30	DIO3
6	CH2 IN	31	DIO4
7	CH10 IN	32	DIO5
8	CH3 IN	33	DIO6
9	CH11 IN	34	DIO7
10	CH4 IN	35	DAGND0
11	CH12 IN	36	VOUT0
12	CH5 IN	37	DAGND1
13	CH13 IN	38	VOUT1
14	CH6 IN	39	CTR1_CLOCK
15	CH14 IN	40	CTR1_GATE
16	CH7 IN	41	CTR1_OUT
17	CH15 IN	42	A/D_EXT_PACER
18	AGND	43	EXT INTERRUPT
19	n/c	44	A/D_PACER GATE
20	n/c	45	A/D_EXT TRIGGER
21	n/c	46	n/c
22	n/c	47	A/D_PACER _OUT
23	n/c	48	VDD
24	n/c	49	n/c
25	n/c	50	DGND

The PC-CARD-DAS16/330 provides eight digital I/O lines (eight in or out, or, four in, four out) and allows the user to sense and control a wide variety of discrete events.

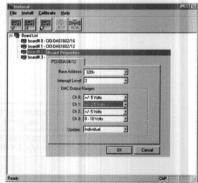
The PC-CARD-DAS16/330 is completely plug-and-play. There are no switches, jumpers or potentiometers on the board. All board addresses, interrupt channels etc. are set by your computers plug-and-play software. Gain/offset calibration is performed in software after reading a precision reference voltage/ground applied to the A/D converter by software command.

The analog inputs are protected up to +55 VDC or -40 VDC with ± 10 volt of common mode range. The high density 50-pin connector is compatible with a wide variety of interconnection options including the CIO-MINI-50, SCB-50 and BNC-16 series. The PC's +5 VDC is brought out to I/O connector and is protected with a 1 Amp, resettable fuse.

Software

The PC-CARD-DAS16/330 comes with ComputerBoards' powerful *Insta*CalTM software package. *Insta*Cal is a complete installation, calibration and test program for ComputerBoards data acquisition and control boards. Complete with extensive error checking, *Insta*Cal guides you through installation and setup of your data acquisition board and creates the board configuration file for use by your program or application software package. *Insta*Cal is described in detail in the Software Installation Manual.

The PC-CARD-DAS16/330 is fully supported by Computer-Boards' powerful Universal Library. Universal Library is a complete set of I/O libraries and drivers for all of our boards, in all Windows based languages. When using the Universal Library you can switch boards or even programming languages and the syntax remains constant.For details on Universal Library, please refer to the Universal Library Manual.



InstaCAL provides installation, calibration and test functions for all of our boards

The PC-CARD-DAS16/330 is fully supported by a wide variety of applications software packages including SoftWIRE™, DAS-Wizard™, (and DAS-Wizard Pro™), HP VEE®, HP VEE Lab and Lab VIEW™. For further details on these, as well as a variety of other software packages, please refer to the software section provided earlier in this catalog.

Performance Specifications

Analog Input

12 bits (1 in 4096) Resolution 160 ppm/°C A/D Gain drift Zero Drift 150 ppm/°C A/D Conversion Time $3 \mu s$

330k samples/sec Throughput Integral nonlinearity ±1LSB max Differential nonlinearity ±1LSB max

Number of channels Input Ranges

16 single-ended ±10V, ±5V

Each channel independently

programmable.

Data transfer modes Common Mode Range CMRR @ 60 Hz Maximum Input Voltage REP-INSW, interrupt, or software polled.

±10V -72bD ±44V

Digital Section

FPGA Digital Type

2 ports of 4 channels each Number of channels

Programmable by port as 4 inputs or 4

outputs per port

external (Ext Int)

Input High 2.0 Volts min, (5.5 Volts absolute max) Input Low 0.8 Volts max. (-0.5 volts absolute min) 3.86 Volts (IOH = -4 mA)Output High Output Low 0.5 Volts (IOL = 4 mA)Interrupts Programmable: levels 2 to 15 Interrupt Enable Programmable Interrupt Sources

End-of-Conversion, FIFO Half-full,

Counter/Pacer

82C54 Type Configuration Three down-counters, 16 bits each

Counter 1 - User-controlled Counter 2 - ADC Lower Divider Counter 3 - ADC Upper Divider & User

Clock Frequency 10 MHz Crystal-Controlled

Counter Clocks Ext, 100kHz (1), 1 MHz, or 10 MHz (2)

Power Consumption

+5V quiescent 65 mA typical, 90 mA maximum +5V CIS read

Environmental

Operating temp range Storage temp range

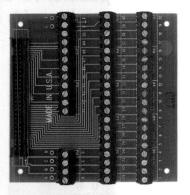
Humidity

75 mA typical, 110 mA maximum

0 to 70°C -40 to 100°C

0 to 90% non-condensing

Screw Terminal Accessories



CIO-MINI50* Lowcost, 50-pin, screw terminal board brings all 50 conductors from a PC CARD-DAS board out to easy to use screw terminals. Requires a CPCC-50 series cable. For standard applications use the CPCC-50F-39 one meter cable. If your application requires a cable length other than one meter use the CPCC-50M-4(4 inches long) and a C50FF-XX series cable in the length desired.

SCB-50 High quality, shielded 50-pin, screw terminal connection box allows you to make your connections in a rugged, shielded enclosure. Requires a CPCC-50 series cable. For standard applications use the CPCC-50F-39 one meter cable. If your application requires a cable length other than one meter use the CPCC-50M-4(4 inches long) and a C50FF-XX series cable in the length desired



*CIO-MIN50 is available with detachable screw terminals. Please see part#CIO-MINI50/DST.

Ordering Guide

PC-CARD-DAS16/330

16-channel 330 kHz analog input board with 8 digital I/O bits and three counter/timers.

CPCC-50F-39

CPCC-50M-4 C50FF-XX

CIO-MINI50*

SCB-50

One-meter Cable, (or)

4-inch Adapter Cable (and) Cable ordered to desired length

50-pin, screw terminal board

Shielded 50-pin, screw terminal connection box

PC-CARD-DAS16/12 & -/12-AO

High-Speed PCMCIA-bus Compatible, 16-Channel Analog Input Board with Eight Digital I/O bits. The -AO version adds two Analog Output Channels.

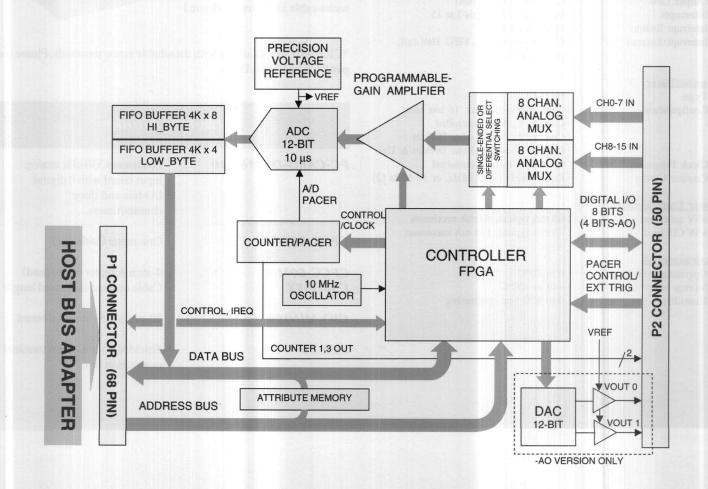




Features

- 16 single-ended or 8 differential analog inputs
- Four bi-polar and four unipolar gain ranges
- On-board, external, or software-polled A/D pacing
- Burst mode support
- 12-bit A/D resolution
- 100 k samples/sec throughput
- 4096 sample FIFO
- Eight bits of digital I/O (Four bits -AO version)
- Dual 12-bit resolution D/A channels (-AO version)
- Resettable fuse on +5 VDC
- Rugged 50-pin connector
- Fully Plug-and-Play

Block Diagram



The PC-CARD-DAS16/12 and PC-CARD-DAS16/12-AO are data acquisition and control boards for PC-CARD/PCMCIA compatible computers with type II slots. The board offers 12-bit A/D resolution and provides 8 differential or 16 single-ended inputs in 4 bipolar and 4 unipolar input ranges. Input configuration is software selectable.

Sample timing is set by an on-board crystal controlled pacer, an external pacer/trigger input (level or edge triggered), or by software polling. The board also allows a burst-mode emulation of a simultaneous sample and hold. The maximum sample rate is 100 ksamples per sec.

Data transfers are made by software polling, a selected interrupt service or REP-INSW. A 4k FIFO buffer provides buffering between the A/D circuit and the PCMCIA bus. Half-full signaling from the FIFO permits simultaneous loading and unloading of the FIFO and assures that no samples are lost.

I/O Connector

All I/O signals pass through a 50-pin high-density connector.

Differential Analog Inputs

Pin	Signal Name	Pin	Signal Name
1	AGND	26	DGND
2 3	CH0 HI	27	DIO0
3	CH0 LO	28	DIO1
4	CH1 HI	29	DIO2
5	CH1 LO	30	DIO3
6	CH2 HI	31	DIO4 (n/c on -AO)
7	CH2 LO	32	DIO5 (n/c on -AO)
8	CH3 HI	33	DIO6 (n/c on -AO)
9	CH3 LO	34	DIO7 (n/c on -AO)
10	CH4 HI	35	DAGND0 (-AO only)
11	CH4 LO	36	VOUT0 (-AO only)
12	CH5 HI	37	DAGND1 (-AO only)
13	CH5 LO	38	VOUT1 (-AO only)
14	CH6 HI	39	CTR1_CLOCK
15	CH6 LO	40	CTR1_GATE
16	CH7 HI	41	CTR1_OUT
17	CH7 LO	42	A/D_EXTERNAL PACER
18	AGND	43	EXTERNAL INTERRUPT
19	n/c	44	A/D_PACER GATE
20	n/c	45	A/D_EXTERNAL TRIGGER
21	n/c	46	n/c
22	n/c	47	A/D_PACER OUT
23	n/c	48	VDD
24	n/c	49	n/c
25	n/c	50	DGND

Single-Ended Analog Inputs

Pin	Signal Name	Pin	Signal Name	
1	AGND	26	DGND	
2	CH0 IN	27	DIO0	
3	CH8 IN	28	DIO1	
4	CH1 IN	29	DIO2	
5	CH9 IN	30	DIO3	
6	CH2 IN	31	DIO4 (n/c on -AO)	
7	CH10 IN	32	DIO5 (n/c on -AO)	
8	CH3 IN	33	DIO6 (n/c on -AO)	
9	CH11 IN	34	DIO7 (n/c on -AO)	
10	CH4 IN	35	DAGND0 (-AO only)	
11	CH12 IN	36	VOUT0 (-AO only)	
12	CH5 IN	37	DAGND1 (-AO only)	
13	CH13 IN	38	VOUT1 (-AO only)	
14	CH6 IN	39	CTR1_CLOCK	
15	CH14 IN	40	CTR1_GATE	
16	CH7 IN	41	CTR1_OUT	
17	CH15 IN	42	A/D_EXTERNAL_PACER	
18	AGND	43	EXTERNAL INTERRUPT	
19	n/c	44	A/D_PACER GATE	
20	n/c	45	A/D_EXTERNAL TRIGGER	
21	n/c	46	n/c	
22	n/c	47	A/D_PACER_OUT	
23	n/c	48	VDD	
24	n/c	49	n/c	
25	n/c	50	DGND	

The PC-CARD-DAS16/12 provides eight digital I/O lines (eight in or out, or, four in, four out) and allows the user to sense and control a wide variety of discrete events.

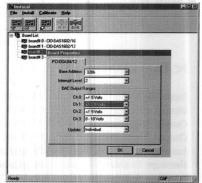
The PC-CARD-DAS16/12-AO version includes dual digital-to-analog converters and provides two accurate, highly stable analog outputs in two programmable ranges. Double buffering of the two outputs permits simultaneous outputting. Adding the analog output capability reduces digital I/O capacity to four I/O lines (four in or four out).

The PC-CARD-DAS16/12 is completely plug-and-play. There are no switches, jumpers or potentiometers on the board. All board addresses, interrupt channels etc. are set by your computers plug-and-play software. Gain/offset calibration is performed in software after reading a precision reference voltage/ground applied to the A/D converter by software command.

Software

The PC-CARD-DAS16/12 comes with ComputerBoards' powerful *Insta*CalTM software package. *Insta*Cal is a complete installation, calibration and test program for ComputerBoards data acquisition and control boards. Complete with extensive error checking, *Insta*Cal guides you through installation and setup of your data acquisition board and creates the board configuration file for use by your program or application software package. *Insta*Cal is described in detail in the Software Installation Manual.

The PC-CARD-DAS16/12 is fully supported by Computer-Boards' powerful Universal Library. Universal Library is a complete set of I/O libraries and drivers for all of our boards, in all Windows based languages. When using the Universal Library you can switch boards or even programming languages and the syntax remains constant. For details on Universal Library, please refer to the Universal Library Manual.



InstaCAL provides installation, calibration and test functions for all of our boards

The PC-CARD-DAS16/12 is fully supported by a wide variety of applications software packages including SoftWIRE $^{\text{\tiny TM}}$, DAS-Wizard $^{\text{\tiny TM}}$, (and DAS-Wizard Pro $^{\text{\tiny TM}}$), HP VEE $^{\text{\tiny SM}}$, HP VEE Lab and LabVIEW $^{\text{\tiny TM}}$. For further details on these, as well as a variety of other software packages, please refer to the software section provided earlier in this catalog.

Performance Specifications

Analog Input

A/D Converter type ADS7804 Resolution 12 bits (1 in 4096) A/D Gain drift 160 ppm/°C Zero Drift 150 ppm/°C A/D Conversion Time 10 µs Integral nonlinearity ±1LSB max

Differential nonlinearity ±1LSB max Throughput 100k samples/sec

Number of channels 8 differential or 16 single-ended Input Ranges ±10V, ±5V, ±2.5V, , ±1.25, or

0 to 10V, 0 to 5V, 0 to 2.5V, or 0 to 1.25V Each channel independently program-

mable.

Data transfer modes REP-INSW, interrupt, or software polled.

Common Mode Range ±10V CMRR @ 60 Hz -72bD

Maximum Input Voltage +50VDC, -44 VDC

Analog Output - PC-CARD-DAS16/12-AO Only

D/A Converter type LTC1446 Resolution 12 bits

Number of Channels Two single-ended voltage outputs ±5V, ±10V, independently programmable

Ranges Current Drive ±2 mA

Gain Error ±1 LSB Offset Error ±1 LSB

Ouput short-circuit Indefinite @ 12 mA

Buffers Double buffered output latches permit updating DACs individually or simultaneously (software selectable)

Digital Section

Digital Type **FPGA**

Number of channels

PC-CARD-DAS16/12 2 ports of 4 channels each

Programmable by port as 4 inputs or 4

outputs per port

PC-CARD-DAS16/12-AO 1 Port. 4 channels

Programmable as 4 inputs or 4 outputs Input High 2.0 Volts min, (5.5 Volts absolute max) Input Low 0.8 Volts max, (-0.5 volts absolute min)

Output High 3.86 Volts (IOH = -4 mA)Output Low 0.5 Volts (IOL = 4 mA)Interrupts Programmable: levels 2 to 15 Interrupt Enable

Programmable

Interrupt Sources End-of-Conversion, FIFO Half-full,

external (Ext Int)

Counter/Pacer

Type 82C54

Configuration Three down-counters, 16 bits each Counter 1 - User-controlled

Counter 2 - ADC Lower Divider Counter 3 - ADC Upper Divider & User

Clock Frequency 10 MHz Crystal-Controlled

Counter Clocks Ext, 100kHz (1), 1 MHz, or 10 MHz (2) **Power Consumption**

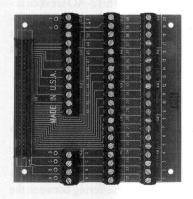
+5V quiescent 65 mA typical, 90 mA maximum +5V CIS read 75 mA typical, 110 mA maximum

Environmental

0 to 70°C Operating temp range Storage temp range -40 to 100°C

Humidity 0 to 90% non-condensing

Screw Terminal Accessories



CIO-MINI50* Low cost, 50-pin, screw terminal board brings all 50 conductors from PC CARD-DAS board out to easy to use screw terminals. Requires a CPCC-50 series cable. For standard applications use the CPCC-50F-39 one meter cable. If your application requires a cable length other than one meter use the CPCC-50M-4(4 inches long) and a C50FF-XX series cable in the length desired.

SCB-50 High quality, shielded 50-pin, screw terminal connection box allows you to make your connections in a rugged, shielded enclosure. Requires a CPCC-50 series cable. For standard applications use the CPCC-50F-39 one meter cable. If your application requires a cable length other than one meter use the CPCC-50M-4(4 inches long) and a C50FF-XX series cable in the length desired



*CIO-MIN50 is available with detachable screw terminals. Please see part#CIO-MINI50/DST.

Ordering Guide

PC-CARD-DAS16/12

PC-CARD-DAS16/12-AO

16-channel analog input

CPCC-50F-39

CPCC-50M-4 C50FF-XX

CIO-MINI50*

SCB-50

board with 8 digital I/O bits and three counter/timers. 8- or 16-channel analog input board with 8 digital I/O bits, two analog ouputs and three counter/timers.

One-meter Cable, (or)

4-inch Adapter Cable (and) Cable ordered to desired length

50-pin, screw terminal board

Shielded 50-pin, screw terminal connection box

PCM-DAS08

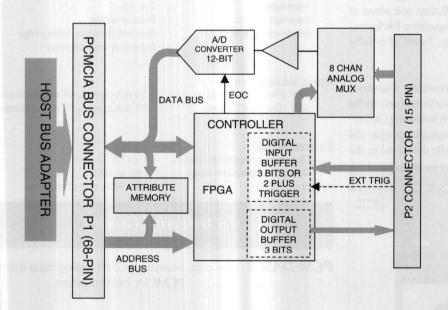
Low Cost, PCMCIA-bus Compatible, 8-Channel Analog Input Board with Six Digital I/O Bits and a Programmable On-Board Pacer Clock



Features

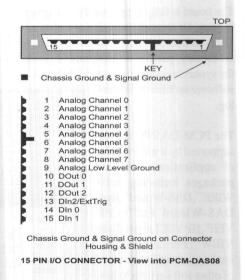
- · Extremely low cost
- 8 single-ended analog inputs
- 12-bit A/D resolution
- ±5 Volt input range
- 25 kHz sample rate, PC dependent
- Internal, external, or software-polled pacing
- Six bits of digital I/O, 3 in, 3 out; or 2 in plus external trigger.
- Compatible with PCMCIA type II or III slots
- · Fully plug-and-play

Block Diagram



I/O Connector & Cables

All I/O signals are brought through a 15-pin connector. The optional PCM-TERM15 cable brings all pins out to handy screw terminals that accept wires from 12 to 22AWG.



The PCM-DAS08 is a low-cost analog input board for PCMCIA- bus compatible computers. Offering eight single-ended 12-bit analog inputs with sample rates up to 25 kHz and A/D resolution of 2.44 mV. The board also provides three digital input and three digital output bits. (±0.5 VDC and ± 0.05 VDC input ranges are available as a factory set option.)

A/D conversions can be triggered by an on-board programmable pacer clock, an external pacer input, or by software polling. The internal pacer clock can trigger A/D conversions at four different rates derived from dividing an internal 25-kHz clock. One of the digital inputs may also be used to generate trigger signals. In triggered mode there are only two usable digital input bits. The actual data transfer is initiated either by an interrupt or by a software poll.

The actual sample rate is a function of the programmed rate and the number of channels being sampled. The per-channel rate is the programmed rate divided by the number of channels; e.g., sampling 8 channels at 25 kHz yeilds a per-channel rate of 3.12 kHz.

The PCM-DAS08 is completely plug-and-play. There are no switches, jumpers or potentiometers on the board. All board addresses, interrupt channels etc. are set by your computer's plug-and-play software.

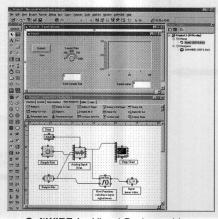
Software

The PCM-DAS08 is shipped with ComputerBoards' powerful *Insta*CalTM software package. InstaCal is a complete installation, calibration, and test program for ComputerBoards data acquisition boards. Using extensive error checking, InstaCal guides you through installation and setup of your data acquisition board. It creates the board configuration file for use by your program or application software package. *Insta*Cal is fully described in a dedicated manual and the catalog.

The board is fully supported by ComputerBoards' powerful Universal Library. Universal Library is a complete set of I/O libraries and drivers for all of our boards, for all Windows-based languages. When using Universal Library, you can switch boards or even programming languages and the syntax remains constant. Universal Library is fully described in the

software section of the catalog.

The PCM-DAS-08 is fully supported by a wide variety of applications software packages including Soft-WIRE™, DAS-Wizard™, (and DAS-Wizard Pro™), HP VEE®, HPVEELab and Lab-VIEW[™]. For further details on these, as well as a variety of other software packages, please refer to the software section provided earlier in this catalog.



SoftWIRE for Visual Basic combines the simplicity of graphical programming with the power and flexibility of programming in VB!

Performance Specifications

Analog input section

A/D converter type ADS574 Resolution 12-bits (2.44 mV) Input ranges ±5V, bipolar

A/D pacing Internal 25kHz divided by 1, 2, 3, or 4; an external source, or software

polled

Data transfer Interrupt or software-polled

Number of channels 8 single-ended

A/D conversion time 25 us

Throughput 25 kHz, PC-dependent

Relative Accuracy ±0.5 LSB Differential Linearity error ±1 LSB Integral Linearity error ±1 LSB No missing codes guaranteed 12 bits ±45 ppm/°C Gain drift (A/D specs) Zero drift (A/D specs) ±10 ppm/°C

Input leakage current ±200 nA max over temperature

Input impedance 10 Megohms min

Absolute maximum input voltage ±15V

Digital Input / Output

FPGA Digital Type

Configuration 3 fixed input (or 2 inputs and Ext

Trig,) 3 fixed outputs

Output High Voltage

(IOH = -4 mA)3.86 volts minimum

Output Low Voltage

(OIL = 4 mA)0.32 volts maximum Input High Voltage 2.0 volts minimum Input Low Voltage 0.8 volts maximum

Absolute maximum input

voltages -0.5 V, +5.5 V

Interrupts 2 to 15 Interrupt enable Programmable

Interrupt sources External (Ext Int), falling edge triggered; Internal pacer

Power consumption

+5V (Normal Operation) 30 mA typical, 69 mA maximum +5V (During CIS read) 59 mA typical, 98 mA maximum

Environmental

Operating temperature range 0 to 70 °C Storage temperature range -40 to 100 °C Humidity 0 to 90%, non-condensing

Ordering Guide

PCM-DAS08 Low cost, 8-channel, 12-bit analog input board for PCMCIA-bus computers.

Screw Terminal Board

PCM-TERM15 15 terminal, mating cable/screw

terminal board

PCM-C15-10-INCH 15-pin cable for custom field wiriing.

PCM-DAC02

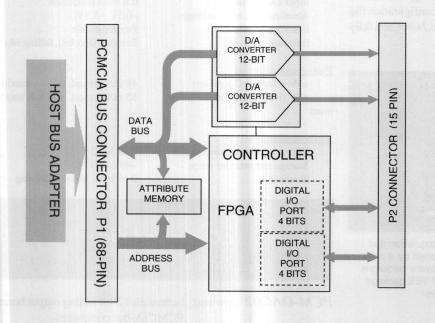
Low Cost, PCMCIA-bus Compatible, 2-Channel, 12-bit Analog Output Board with Eight Digital I/O Bits



Features

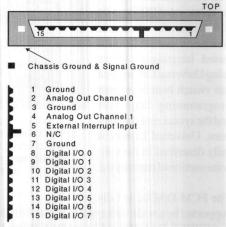
- Extremely low cost.
- Two single-ended analog outputs.
- 12-bit D/A resolution.
- ±10V, ±5V bipolar, or, 0 to 10V, or 0 to 5V unipolar output range, each channel individually set.
- 7.2V/µs slew rate
- Eight digital I/O bits programmable as 8 inputs, or 8 outputs, or 4 inputs and 4 outputs.
- Compatible with PCMCIA type II or III slots.
- Fully plug-and-play.

Block Diagram



I/O Connector & Cables

All I/O signals pass through a 15-pin connector. The optional PCM-TERM15 cable brings all pins out to handy screw terminals that accept wires from 12 to 22AWG.



Chassis Ground & Signal Ground on Connector Housing & Shield

15 PIN I/O CONNECTOR - View into PC-CARD-DAC02

The PCM-DAC02 is a low cost, two channel analog output board for PCMCIA and compatible computers (type II slots). The board provides 12-bit resolution. Double-buffering of the ouput registers permit the outputs to be updated simultaneously or independently.

Four analog outputs ranges are provided; ±5V (2.44 mV resolution), ±10V (4.88 mV resolution), 0 to 5V (1.22 mV resolution) or 0 to 10V 2.44 mV resolution). Channel ranges are individually programmable.

The board is calibrated before leaving the factory. It can be recalibrated at any time using Insta Cal and a DVM. Significant reductions in gain and offset errors are made if stored calibration factors are applied by software each time the board is run.

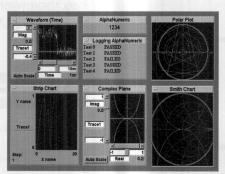
Eight bidirectional digital I/O lines arranged in two 4-bit ports provide the capability of sensing and controlling discrete events. The ports can be programmed to be eight inputs, eight outputs, or four inputs and four outputs.

The PCM-DAC02 is completely plug-and-play. There are no switches, jumpers, or potentiometers on the board. All board addresses, interrupt channels etc. are set by your computer's plug-and-play software.

Software

All PCM-DAC02 boards come with ComputerBoards's powerful InstaCal™ software package. InstaCal is a complete installation, calibration, and test program for ComputerBoards data acquisition boards. Using extensive error checking, InstaCal guides you through installation and setup of your data acquisition board. It creates the configuration file for use by your program or application software package. InstaCal is fully described in a dedicated manual and our catalog.

The board is fully supported by ComputerBoards' powerful Universal Library. The Universal Library is a complete set of I/O libraries and drivers for all of our boards and for all Windowsbased languages. When using Universal Library, you can switch boards or even programming languages and the syntax remains constant. Universal Library is fully described in the software section of our catalog.



ComputerBoards data acquisition and control boards are supported by a wide variety of third party software packages including the poweful HP VEE package shown above!

The PCM-DAC02 is fully

supported by a wide variety of applications software packages including SoftWIRE[™], DAS-Wizard[™], (and DAS-Wizard Pro[™]), HP VEE[®], HP VEE Lab and LabVIEW™. For further details on these, as well as a variety of other software packages, please refer to the software section provided earlier in this catalog.

Performance Specifications

Analog Output Section

D/A converter type AD7837 dual 12-bit MDAC 12-bits (2.44 mV) Resolution ±5V or ±10V, bipolar, or Output ranges 0 to 5V or 0 to 10V unipolar

Software paced D/A pacing D/A Trigger modes Software Data transfer Programmed I/O Number of channels 2 single-ended Throughput System-dependent Differential nonlinearity (D/A spec) ±1 LSB maximum Integral Nonlinearity (D/A spec) ±1 LSB maximum

Monotonicity

Guaranteed monotonic Offset error

±1 LSB Calibrated value

Gain error

Calibrated value ±1 LSB Accuracy ±1 LSB Slew rate 7.2V/μs typ. Settling time (to 1/2 LSB of FSR) 8 μs typ.

±2.5 mA, single-ended Current drive Output short-circuit duration 15 mA, indefinite

Output coupling

Miscellaneous Double-buffered output latches

Digital Input/Output

FPGA Digital Type

Configuration Two ports, four bits each Programmable as: 8 in, or 8 out, or 4 in and 4 out

Output High Voltage

3.86 Volts minimum (IOH = -4 mA)

Output Low Voltage (OIL = 4 mA)0.23 Volts maximum Input High Voltage 2.0 Volts minimum Input Low Voltage 0.8 Volts maximum Absolute max input voltage -0.5V, +5.5V

Interrupt enable Programmable

Interrupt sources External (Ext Int), falling edge

Power consumption

+5V (Normal Operation) 48 mA typical, 65 mA maximum +5V (During CIS read) 65 mA typical, 105 mA maxi-

mum

Environmental

0 to 70°C Operating temperature range Storage temperature range -40 to 100°C

Humidity 0 to 90%, non-condensing

Ordering Guide

PCM-DAC02 Low cost, 2-channel, 12-bit analog output board for PCMCIA-bus computers.

Standard I/O Connection

PCM-TERM15 15 terminal, screw terminal board

PC-CARD-DIO48

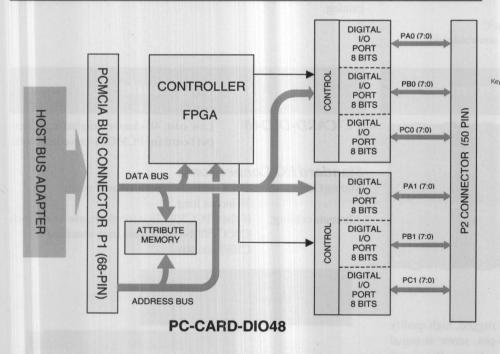
48-Bit PCMCIA-bus Compatible, Digital Input/Output Board



Features

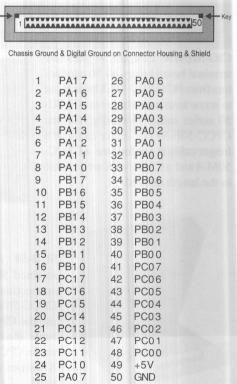
- 48 digital inputs or outputs
- 4 banks of 8 each, plus 4 banks of 4 each
- Each banks is individually programmed as input or output
- 82C55 I/O chip programmable in three modes; input/output, strobed I/O, or bi-directional bus
- · Extremely low cost
- Uses rugged high-density 50-pin connector
- +5 VDC from computer brought out through resettable 1 A fuse
- Completely plug-and-play

Block Diagram



I/O Connector

All I/O signals pass through a 50-pin connector.



The PC-CARD-DIO48 is a 48-bit digital I/O board for PCMCIA/PC Card computer with type II slots. The board provides two 82C55 digital PIA interface chips brought out to a 50-pin connector that also supplies access to PC ground and +5VDC. The +5VDC connection is protected by a resettable 1 Amp fuse.

The PC-CARD-DIO48 is completely plug-and-play. There are no switches, jumpers or potentiometers on the board. All board addresses, interrupt channels etc. are set by your computer's plug-and-play software.

Performance Specifications

Digital Input / Output

Digital Type Configuration

Programmable as:
Output High Voltage
Output Low Voltage
Input High Voltage
Input Low Voltage
Absolute max input voltages
Power-up/Reset State

Power consumption +5V (Normal Operation)

Environmental

Operating temperature range Storage temperature range Humidity MSM82C55

4 banks of 8 each, plus 4 banks of 4 each (48 inputs total) Each bank as input or output

3.7 Volts min. @ -2.5 mA 0.4 Volts max. @ 2.5mA

2.2 Volts min., 5.5V absolute max. 0.8 Volts max., -0.5V absolute min. -0.5V, +5.5V

Input mode (high impedance)

37 mA typical, 55 mA maximum

0 to 70°C -40 to 100°C

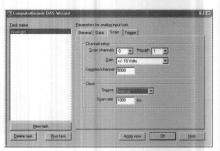
0 to 90%, non-condensing

Software

All PC-CARD-DIO48 boards come with ComputerBoards' powerful *Insta*CalTM software package. *Insta*Cal is a complete installation, calibration, and test program for ComputerBoards data acquisition boards. Using extensive error checking, *Insta*Cal guides you through installation and setup of your data acquisition board. It creates the configuration file for use by your program or application software package. *Insta*Cal is fully described in the software section of this catalog.

The board is fully supported by ComputerBoards' powerful Universal Library. The Universal Library is a complete set of I/O libraries and drivers for all of our boards and for all Windows-based languages. When using Universal Library, you can switch boards or even programming languages and the syntax remains constant. Universal Library is fully described in the software section of our catalog.

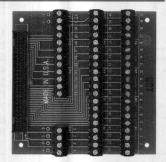
The PC-CARD-DIO48 is fully supported by a wide variety of applications software packages including SoftWIRE™, DAS-Wizard™, (and DAS-Wizard Pro™), HP VEE®, HP VEE Lab and LabVIEW™. For further details of these, as well as a variety of other software packages, please refer to the software section provided earlier in this catalog.



well as a variety of other Configuring your DAS-Wizard application is software packages, please refer to the software secreter to the software sec

Screw Terminal Accessories

CIO-MINI50* Lowcost, 50-pin, screw terminal board brings all 50 conductors from PC CARD-DAS boards out to screw terminals. Requires a CPCC-50 series cable. Normally, use the CPCC-50F-39 one-meter cable. If a longer cable is needed, use a CPCC-50M-4 and a C50FF-XX series cable in the length desired.





SCB-50 A rugged, high quality shielded 50-pin, screw terminal connection enclosure. Requires a CPCC-50 series cable. Normally, use the CPCC-50F-39 one-meter cable. If a longer cable is needed, use the CPCC-50M-4 and a C50FF-XX series cable in the length desired

Ordering Guide

PC-CARD-DIO48

Low cost, 48-channel, digital input/output board for PCMCIA-bus computers.

Standard I/O Connections

Mating Cable: CPCC-50F-39, female on user's end,

39 inches long.

Alternate cabling: If the CPCC50F-39 is too short, use a four-inch

CPCC-50M-4 cable and a user-specified

C50FF-xx cable.



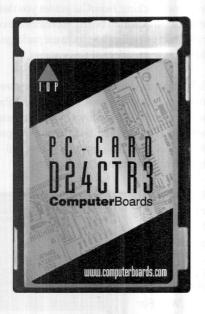


Signal conditioning

The PC-CARD-DIO48 is compatible with a wide variety of digital signal conditioning products. For further details please see pages 173-178.

PC-CARD-D24/CTR3

Low Cost, PCMCIA-bus Compatible 24-Channel Digital Input/Output Board with Three Programmable Counter/Timers



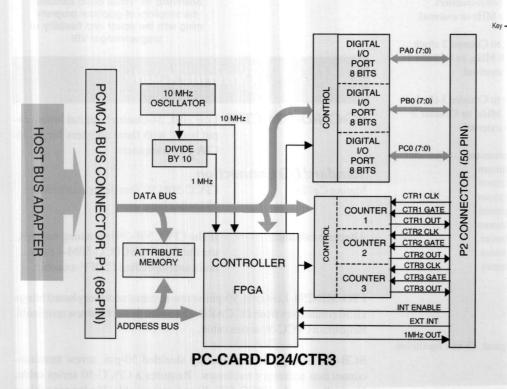
Features

- 24 digital inputs or outputs
- 2 banks of 8 each, plus 2 banks of 4 each
- Each banks is programmed as input or output
- 82C55 I/O chip programmable in three modes; input/output, strobed I/O, or bi-directional bus
- 82C54 counter provides three, 16- bit counters
- Extremely low cost
- Compatible with PCMCIA type II or III slots
- Closely compatible with ISA board structure
- · Fully plug-and-play

Block Diagram

I/O Connector & Cables

All I/O signals pass through a 50-pin connector.



1 1	********	****	50
Chassis	Ground & Digital Ground on Co	onnector Housing	& Shield
1	EXTINT	26	PA6
2	GND	27	PA5
3	INTENABLE	28	PA4
4	GND	29	PA3
5	CTR1 CLK	30	PA2
6	GND	31	PA1
7	CTR1 GATE	32	PA0
8	GND	33	PB7
9	CTR1 OUT	34	PB6
10	GND	35	PB5
11	CTR2 CLK	36	PB4
12	GND	37	PB3
13	CTR2 GATE	38	PB2
14	GND	39	PB1
15	CTR2OUT	40	PB0
16	GND	41	PC7
17	CTR3 CLK	42	PC6
18	GND	43	PC5
19	CTR3 GATE	44	PC4
20	GND	45	PC3
21	CTR3OUT	46	PC2
22	GND	47	PC1
23	1MHzOUT	48	PC0
24	GND	49	+5V
25	PA7	50	GND

The PC-CARD-D24/CTR3 is a digital I/O card for PCMCIA compatible computers. The board provides 24-bits of parallel digitaly I/O using an 82C55 chip and three 16-bit down counters based on the 82C54. An on-board 10 MHz clock may be connected to the counter inputs.

The PC-CARD-D24/CTR3 is completely plug-and-play. There are no switches, jumpers or potentiometers on the board. All board addresses, interrupt channels etc. are set by your computer's plug-andplay software.

Performance Specifications

82C55, 2 banks of 8 each, plus 2 banks of 4 each (24 inputs total)

Each bank as input or output

2.2 volts min., 5.5 V absolute max.

Programmable: external (Ext Int) or

internal (counter 1 output, counter

2 output, counter 3 out, 82C55

port C bit C0 or bit C3)

3, 16-bit down-counters

output, or external.

output, or external.

To user connector

30 ns minimum

50 ns minimum

50 ns minimum

50 ns minimum

0.8V maximum

2.0V minimum

0.4V maximum

3.0V minimum

10 MHz

50 ppm

1 MHz

Internal 10 MHz or external

To user or to Counter 2 clock

To user or to Counter 3 clock

Internal 1 MHz, or Counter 2

Internal 10 MHz, or Counter 1

0.8 volts max. -0.5 V abs. min.

Input mode (high impedance)

Programmable levels 2 to 15

3.0 volts min. @-2.5 mA

0.4 volts max. @2.5 mA

-0.5 V, +5.5 V

Programmable

External

External

External

Digital Input/Output

Configuration

Programmable as: Output High Voltage Output Low Voltage Input High Voltage Input Low Voltage Absolute max input voltage Power-up/Reset State Interrupts Interrupt enable Interrupt sources

Counter

Counter Type Configuration Counter 1 clock Counter 1 Gate Counter 1 Output Counter 2 clock

Counter 2 Gate Counter 2 Output Counter 3 clock

Counter 3 Gate Counter 3 Output Clock input pulse width (high) Clock input pulse width (low)

Gate width, high-going

Gate width, low-going Input low voltage Input high volltage Output low voltage Output high voltage Crystal Oscillator Frequency accuracy Output frequency available

Power consumption

+5V (Normal Operation)

Environmental

Operating temperature range Storage temperature range Humidity

0 to 70°C -40 to 100°C

0 to 90%, non-condensing

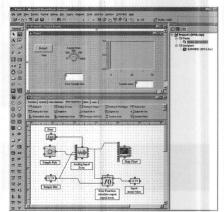
45 mA typical, 65 mA maximum

Software

All PC-CARD-D24/CTR3 boards come with ComputerBoards' powerful InstaCalTM software package. InstaCal is a complete installation, calibration, and test program for ComputerBoards data acquisition boards. Using extensive error checking, *Insta*Cal guides you through installation and setup of your data acquisition board. It creates the configuration file for use by your program or application software package. *Insta*Cal is fully described in the software section of this catalog.

The board is fully supported by ComputerBoards' powerful Universal Library. The Universal Library is a complete set of I/O libraries and drivers for all of our boards and for all Windows-based languages. When using Universal Library, you can switch boards or even programming languages and the syntax remains constant. Universal Library is fully described in the software section of our catalog.

The PC-CARD-D24/CTR3 is fully supported by a wide variety of applications software packages including SoftWIRE™, DAS-Wizard™, (and DAS-Wizard Pro™), HP VEE®, HP VEE Lab and LabVIEW[™]. For further details on these, as well as a variety of other software packages, please refer to the software section provided earlier in this catalog.



SoftWIRE for Visual Basic combines the simplicity of graphical programming with the power and flexibility of programming in VB!

Ordering Guide

PC-CARD-D24/CTR3 Low cost, 24-channel, digital input/output board with three counters for PCM-CIA-bus computers.

Standard I/O Connection

Mating Cable:

CPCC-50F-39, female on user's end, 39 inches long.

Alternate cabling:

If the CPCC50F-39 is not long enough, use the four-inch CPCC-50M-4 cable. and a user-specified C50FF-xx cable.

CIO-MINI50 Low cost, 50-pin, screw terminal accessory board brings all 50 conductors from PC CARD-DAS boards out to screw terminals. Requires a CPCC-50 series cable.

SCB-50 A rugged, high quality shielded 50-pin, screw terminalconnection accessory enclosure. Requires a CPCC-50 series cable. Normally, use the CPCC-50F-39 one-meter cable. If a longer cable is needed, use the CPCC-50M-4 and a C50FF-XX series cable in the length desired.

PCM-QUAD02

2-Channel Quadrature Encoders Interface for PCMCIA Compatible Computers.



Features

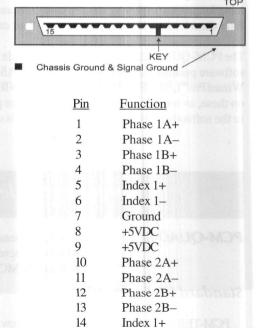
- Extremely low cost
- Two channels for Phases A, B, Index and optional 5VDC encoder power
- Inputs configurable for single-ended or differential inputs
- Cascadable counters allow non-quadrature counting up to 48 bits.
- Powerful interrupt management capabilities.
- Quad receiver designed for long lines in noisy environments.
- Phase A, B, and index inputs pre-configured for differential mode with termination resistors installed.
- Fully plug-and-play.

Block Diagram

IRQ **PCMCIA BUS** CONTROL **ADDRESS** BUS CONTROL -HOST BUS ADAPTER **DECODING** -SIGNAL ROUTING -CONNECTOR ATTRIBUTE MEMORY **FPGA** DATA BUS CONTROL QUAD (15 pin) DIFF. RECEIVER 24-Bit DUAL AXIS P RECEIVER QUADRATURE 75ALS175 75ALS175 COUNTER (68-PIN) CONNECTOR CHANNEL CHANNEL SETTING P2 QUADRATURE ENCODER INPUTS PHASE A+/-, PHASE B+/-, INDEX +/-

I/O Connector & Cables

Use standard AMP 15-pin PCMCIA connector mated to screw terminal board, for example a PCM-TERM15. Or, use standard AMP 15-pin PCMCIA connector mated to non-terminated cable such as a PCM-C15-10-INCH.



Index 1-

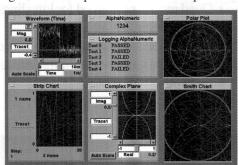
The PCM-QUAD02 is a two channel quadrature encoder input board for PCMCIA compatible computers. The board is based on the popular LS7266, 24-bit dual-axis quadrature counter IC from LSI Computer Systems. This component contains: 24-bit counters, 24-bit preset and 24-bit output latch registers, Integrated digital filtering, 8-bit counter prescalers and programmable index functionality.

The board is fully plug-and-play without requiring the user to set any switches, jumpers or other adjustments of any kind.

Software

All PCM-QUAD02 boards come with ComputerBoards' powerful InstaCal™ software package. InstaCal is a complete installation, calibration, and test program for ComputerBoards data acquisition

boards. Using extensive error checking, InstaCal guides you through installation and setup of your data acquisition board. It creates the configuration file for use by your program or application software package. InstaCal is fully described in the software section of our catalog.



ComputerBoards data acquisition and control boards are supported by a wide variety of third party software packages including the poweful HP VEE package shown above!

The board is fully supported by ComputerBoards' powerful Universal Library. The Universal Library is a complete set of I/O libraries and drivers for all of our boards and for all Windows-based languages. When using Universal Library, you can switch boards or even programming languages and the syntax remains constant. Universal Library is fully described in the software section of our catalog.

The PCM-QUAD02 is fully supported by a wide variety of applications software packages including SoftWIRE™, DAS-Wizard™, (and DAS-Wizard Pro™), HP VEE®, HP VEE Lab and Lab VIEW™. For further details on these, as well as a variety of other software packages, please refer to the software section provided earlier in this catalog.

Ordering Guide

PCM-QUAD02

Low cost, 2-channel decoder for the interface between incremental quadrature encoders and PCMCIA computers.

Standard I/O Connection

PCM-TERM15

15 terminal, screw terminal board

Performance Specifications

Input Section

SN75ALS175 quad Receiver type differential receiver

Each channel consists of Configuration

PhaseA input, PhaseB input and Index input

Common mode input voltage range

Differential input voltage range

Input sensitivity

Input hysteresis Input impedance Propagation delay

Absolute max input voltage-Diff.

±12V max ±12V max

±200mV 50mV typ. 12 kohm min.

27 ns max. ±25V max.

4.3 MHz max

57 ns min

85 ns min

115 ns min

Counter Section

Counter type

LS7266R1 Quadrature Mode

Clock frequency Separation Clock pulse width

Index pulse width

Count Mode

Clock frequency

Clock A - high pulse width Clock A - low pulse width

Filter clock (FCK) Digital filter rate

30 MHz max, (25 MHz

max Mod-N mode)

16 ns min 16 ns min 10 MHz

10 MHz, softwareselectable divider

(1 to 256 in single steps)

Crystal oscillator (FCK source)

Frequency 10 MHz Frequency accuracy 100 ppm

Interrupt Controller Section

Controller type **FPGA**

Configuration Polled mode only

Interrupts 2 to 15 Interrupt enable Programmable

All Carry/Borrow Interrupt sources outputs from LS7266R1,

all Index inputs

Power consumption

(Not supplying +5VDCpower) 80 mA max, 50 mA typ.

(Typ supplying Rotary Encoder +5V) 179 mA Max. peak current to encoders (each) 400 mA

Environmental

Operating temperature range

Storage temperature range Humidity

0 to 70 °C -40 to 100 °C 0 to 90%

non-condensing

Uses 16550 UART

• 5, 6, 7, or 8 data bits

· odd, even or no parity

· 115 KBaud data rates

16550

out, even or no parity

0, 1 or 2 stop bits

UART

PCM-COM485 & PCM-COM422







Features

- RS-422 or 485 serial ports
- Uses 16550 UART
- 5, 6, 7, or 8 data bits
- · odd, even or no parity
- · 115 KBaud data rates

Specifications Serial ports

Serial modes

Configured as COM1, 2, 3 or 4

or COM4

Max, baud rate 56KB as COMn: port

> 115 KB with custom SW 5, 6, 7, or 8 data bits

odd, even or no parity

0, 1 or 2 stop bits

(RS-485 only) Software Output control

selectable transmitter allows networked operation

UART 16550 Cable length Network nodes 1.2 Kilometer (422 & 485) Up to 32 (RS-485 only)

Form Factor

L434-141

PCMCIA type II compliant

Software Description

Compatible with your computers built-in serial port control software.

Board Configurations & Cables

PCM-COM485 single port RS-485 interface. Use

PCM-C485/485 cable

PCM-COM422 provides a single port of either RS-232 or RS-422. For RS-232 use PCM-C422/232 cable. for RS-422 use PCM-C422/422 cable

PCM-C232-12I



Description

Brings RS-232 serial communication signals out to standard DB9

For Use with:

PCM-COM232 (one cable is included with the card.)

CM-C422/422



Description

Brings RS-422 serial communication signals out to standard DB9

For Use with: PCM-COM422

PCM-C422/232



Description

Brings RS-232 serial communication signals out to standard DB9

For Use with: PCM-COM422

PCM-C485/485



Description

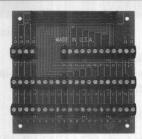
Brings RS-485 serial communication signals out to standard DB9

For Use with: PCM-COM485

Premium Quality, Superior Performance and Low Prices.

Cables and Screw Terminal Accessories for PC-CARD / PCMCIA Compatible I/O Interfaces

CIO-MINI50



Description

Low cost screw terminal board for PC-CARD series I/O cards. Requires CPCC series cable.

For Use with:

Any PC-CARD series I/O card.

SCB-50



Description

Shielded, screw terminal connection box for PC-CARD series I/O cards. Requires CPCC series cable.

For Use with:

Any PC-CARD series I/O card.

CPCC-50F-39



Description

Brings 50-Pin, PC-CARD series connector out to standard female 50-pin connector (39 inches long).

For Use with:

PC-CARD series and the CIO-MINI50, SCB-50 or any 50-Pin compatible signal conditioning products.

CPCC-50M-4



Description

Brings 50-Pin, PC-CARD series connector out to 50-Pin male connector that connects to any C50FF-series cable (4 inches long).

For Use with:

PC-CARD series and the CIO-MINI50, SCB-50 or any 50-Pin compatible signal conditioning products.

PCM-TERM15



Features

- 15 pin screw terminal board
- Accepts 12-22 AWG wire
- · Low cost
- · Small footprint

For Use with: PCM-DAS08, PCM-DAC02 and PCM-QUAD02

PCM-C15-10-INCH



Features

- 15 pin cable brought out to pig-tails for custom field wiring
- 10 inches long

For Use with: PCM-DAS08, PCM-DAC02 and PCM-QUAD02

SoftWIRETM

Graphical Programming for Visual Basic

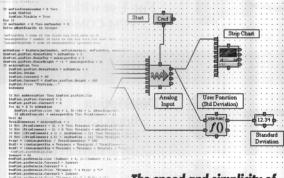
Introducing SoftWIRE™

Graphical Programming in Visual Basic®

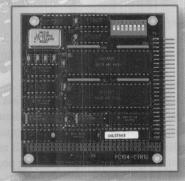
Syntactical programming has been around since the early days of computers. More recently, graphical programming languages have been introduced and are now a popular alternative to writing hard core, text-based syntax. What's been lacking is an easy way to combine the speed and ease of use of graphical programming with the flexibility and efficiency of writing code in an industry standard language. Until now—Introducing SoftWIRE.

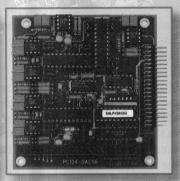
For more information on SoftWIRE, please see pages 6 -10 in this catalog.

The power and flexibility of syntactical programming

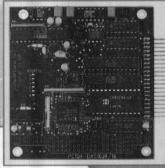


The speed and simplicity of graphical programming

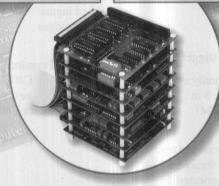








Data acquisition, control and communications interfaces for small and embedded applications



PC/104 Compat	ible I/O Products	Page
PC104-DAS16JR/16	16-channel 100-kHz 16-bit A/D, SPGA, 3 CTR, 8 DIO	168
PC104-DAS16JR/12	16-channel 150-kHz 12-bit A/D, SPGA, 3 CTR, 8 DIO	168
PC104-DAS08	8-channel 20-kHz 12-bit A/D, 3 DI, 4DO, 3 CTR	168
PC104-DAC06	6-channel 12-bit analog output board	168
PC104-DAC06-I	6-channel 12-bit analog current output board	168
PC104-CTR10HD	10 Counter/timer channels (two AM9513) / 100ppm XTAL	169
PC104-CTR10HD/H50	10 Counter/timer channels (two AM9513) / 50ppm XTAL	169
PC104-DIO48	48-bit digital input/output board (2, 8255s), 50-pin connectors	169
PC104-D148	48-bit digital input board, 50-pin connector	169
PC104-DO48H	48-bit high drive (64mA) digital output board, 50-pin connector	169
PC104-PDISO8	8-bit electromechanical relay board, with 8 isolated (500V) digital inputs	170
PCI04-LPT/2COM232	LPT port & 2 COM ports with RS-232 protocol, 16550 UART	170
PCI04-LPT/2COM422	LPT port & 2 COM ports with RS-422 or RS-485 protocol, I6550 UART	170
CI0-COM-2	2-foot PC104-LPT/2COM to 9-pin D serial port cable	170
C26-LPT-2	2-foot PC104-LPT/2COM to 25-pin D printer port cable	170

- 16 chan SE / 8 chan diff
- 8 digital I/O bits, 4 in, 4 out
- 512 Sample FIFO

Input bits
Output bits

4, HC family (see pg. 271) 4, HC family (see pg. 271) or C40-37F-# / CIO-MINI37 or C40-37F-# / SCB-37 Simultaneous S&H: C40-37F-#/CIO-SSH-16

PC104-DAS08



Features

- PC104 Form factor
- 8 Channel single-ended
- 12-Bit, 20KHz A/D
- 3 counters
- 7-Bits of digital I/O

Analog Input Specifications

Input resolution 12-bits (1 in 4096) Input ranges: $\pm 10V, \pm 5V, 0-10V$ Range selection Switch selectable

Max sample rate 20 KHz

Trigger/timing Int/ext clock and trigger

Digital Input/Output (see pg 271 for family specs)

Number of bits 7-bits TTL, 4 out, 3 in Counter/timer Three 16-bit (82C54)

Software Description

Includes *Insta*Cal, installation, calibration and test software. Supported by the Universal Library programming language library. Also supported by SoftWIRE, DAS Wizard, HP VEE LAB and most third party, high-level data acquisition programs..

Channel Expansion and Signal Conditioning

For more channels
For isolated inputs
For RTD or bridges

See CIO-EXP-series
See ISO-RACK08
See EXP-GP, RTD
or BRIDGE16

Cables / Screw Terminal / Acces Boards

Analog: C40FF-# / CIO-MINI40

or C40-37F-# / CIO-MINI37 or C40-37F-# / SCB-37

Expansion: C40-37F-#/CIO-EXP-series

PC104-DAC06 & PC104-DAC06-I



Features

168

- PC104 Form factor
- 6 D/A channels
- Voltage output (-DAC06)
- 4-20 mA output (-DAC06-I)
- 12-bit resolution
- · One D/A per channel

General Output Specifications

Channels

Configuration 1 independent D/A

per channel

Output resolution 12-bits (1 in 4096)
Output updates Independent or simultaneous

Voltge Output Specs

Voltage ranges $\pm 10V$, $\pm 5V$, 0-10V, 0-5V

Output current ±5 mA, min
Output resistance <0.1 Ohm
Short circ. current 40 mA min

Range selection Jumper selectable
Output settling 25 uS typ, 40 uS max

Output updates Independant or simultaneous

Current Output Specs: PC104-DAC06-I

Output range: 4-20 mA Compliance voltage 8-36 V

Software Description

Includes *InstaC*al, installation, calibration and test software. Supported by the Universal Library programming language library. Also supported by SoftWIRE, DAS Wizard, HP VEE LAB and most third party, high-level data acquisition programs.

Cables / Screw Terminal Boards

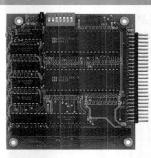
Standard: C40FF-# / CIO-MINI40

or C40-37F-# / CIO-MINI37 or C40-37F-# / SCB-37

- · 9513 based
- 1 MHz & 5 MHz on board XTAL oscillator source

division, generating complex duty cycles and much more. It supports one-shot and continuous modes.

PC104-DIO48



Features

- PC104 Form factor
- 48 Digital I/O bits configured as two 82C55 chips

Digital I/0 Specifications

I/O bits 48 (DIO48)

Configuration Two 82C55 chips

82C55 Specifications

I/O bits 24 divided into two 8-bit

and two 4-bit ports. Each port can be set as input or output.

Logic family CMOS (see pg. 271 for CMOS

family information)

Compatible Accessory Boards

Solid-state relays: SSR-RACK series Electromechanical relays: CIO-ERB series

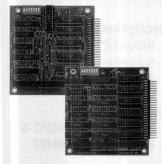
Software Description

Includes *Insta*Cal, installation, calibration and test software. Supported by the Universal Library programming language library. Also supported by SoftWIRE, DAS Wizard, HP VEE LAB and most third party, high-level data acquisition programs.

Cables / Screw Terminal Boards C50FF-#/ CIO-MINI50 or

C50FF-# / SCB-50

PC104-DI48 & PC104-DO48H



Features

- PC104 Form factor
- 48 Digital outputs (-DO48H)
- 48 Digital inputs (-DI48)

PC104-DI48

I/O bits 48

Configuration 8-Bit ports

Logic Levels TTL (see pg. 271 for

family information)

Compatible signal conditioning boards: Solid-state I/O modules: SSR-RACK series

PC104-DO48H

I/O bits 48

Output specs (STTL series, see page 271)

Sink 64 mA min. at 0.55 V max. Source -15 mA min at 2.5 V min

Compatible Accessory Boards:

Solid-state relays: SSR-RACK series Electromechanical relays: CIO-ERB series

Software Description

Includes *Insta*Cal, installation, calibration and test software. Supported by the Universal Library programming language library. Also supported by SoftWIRE, DAS Wizard, HP VEE LAB and most third party, high-level data acquisition programs.

Cables / Screw Terminal Boards C50FF-#/ CIO-MINI50 or

C50FF-# / SCB-50 or

C50FF-# / CIO-SPADE50 (for spade lugs

Also please refer to the ERB & SSR series of signal conditioning boards.

PCI04 Bus I/O BOARDS

Includes InstaCal, installation, calibration and test

software. Supported by the Universal Library pro-

gramming language library. Also supported by

SoftWIRE, DAS Wizard, HP VEE LAB and most

third party, high-level data acquisition programs..

PC104-PDISO8



Features

- · PC104 Form factor
- 8 Electromechanical relays
- 8 Isolated inputs

Specifications

Contact type Contact resistance

Relays

Contact rating

5 Form C, 3 Form A NO

2A at 28VDC

0.6A at 120VAC

Gold overlay silver

100 mOhms max

100 Million operations, min

Cables / Screw Terminal Boards

C40FF-# / CIO-MINI40 or C40-37F-# / CIO-MINI37 or

C40-37F-# / SCB-37

Software Description

For spade lug terminals choose C40-37F-# / CIO-SPADE50

Isolated inputs:

Type **Isolation**

Input Range

Input Impedance

Life

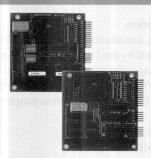
Opto-isolated, non-polarized. 500V Chan-to-Chan &

Channel-to-Ground

5-28VDC or AC 50-1000Hz

450 Ohms Min

PC104-LPT/2COM232 & PC104-LPT/2COM422



Features

- PC104 Form factor
- Adds 1 LPT parallel/printer port
- 2 RS-232 ports (/2COM232)
- 2 RS-422 or RS-485 ports (/2COM422)

Serial Port Specifications

Serial ports

Max. baud rate

Serial modes

2, independant RS-232 (2COM232) Port specs

RS-422 (2COM422)

RS-485 (2COM422)

Mode selection The 2COM422 is strap

selectable as RS-422 or

RS-485

COM1, COM2, COM3 Configured as

or COM4

UART 16550 w/16-byte FIFO

56 KBaud

5, 6, 7, or 8 data bits

odd, even or no parity 0, 1 or 2 stop bits

Parallel/Printer/LPT port

The PCM-LPT adds a standard parallel/LPT port to any PC104 compatible computer. It may be

set as LPT1, LPT2 or LPT3

Software Description

Works with your computer's built-in printer and

COM port drivers.

Cables

Serial port cable

C10-COM-# series

Parallel port cable

C26-LPT-# series

C10-COM-2



Description

Brings RS-232, RS-422 or RS-485 serial port signals out to standard DB9 connector

For Use with:

PC104-LPT/2COM232 & PC104-LPT/2COM422

C26-LPT-#



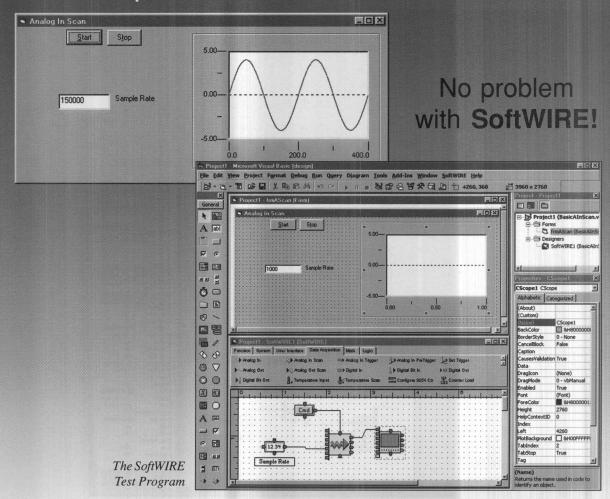
Description

Brings LPT printer port out to standard 25-pin printer port.

For Use with:

PC104-LPT/2COM232 & PC104-LPT/2COM422

Seamless Oscilloscope display at up to 150 kHz?



Program Description

To test the maximum input scan rate that SoftWIRE can write real time to the *Oscilloscope* display we performed the following test. We used the *AnalogInScan* block and sampled a sine wave input. We then continuously plotted it to an **Oscilloscope** control with seamless display of data. At rates up to 150 kHz, we could see no discernable errors or discontinuities in the display.

Note that the 150 kHz we tested at applies to the real time *display* of the data collected, not the rate at which data can be collected. The use of the SoftWIRE AnalogInScan control does not impose any limitations on the collection rate beyond those imposed by the hardware itself.

PC Specifications

600MHz Pentium III with 512MB RAM Diamond Viper V770 for Windows 98 Video card w/32MB video memory

DAQ Board Specifications

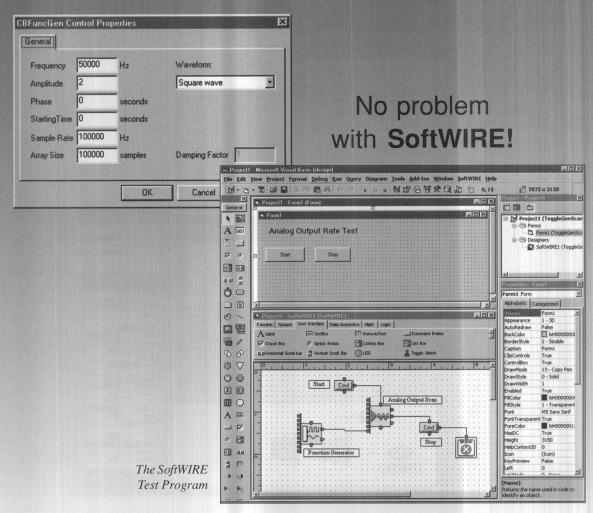
PCI-DAS1602/16 (See pages 43-46) Maximum Analog Input Scan rate: 200kHz Maximum Analog Output Scan rate: 100kHz per channel

For more information on **SoftWIRE**, please see pages 6–10 in this catalog or visit **www.computerboards.com/softwire**



Graphical Programming in Visual Basic®

Seamless D/A Output at 100 kHz?



Program Description

To test the maximum output rate that SoftWIRE can write real time to the *AnalogOutputScan* block we performed the following test. We used the *Function Generator* block to output a 50 kHz square wave and set the D/A board to update at 100 kHz. We then watched the output on an Oscilloscope. Any missed samples would have shown up as

double-width square. (By the way, we were able to write to both D/A channels at the same time without a problem!)

Note that the 100 kHz limitation we tested to is also the limit of the board. SoftWIRE could have gone even faster!

PC Specifications

600MHz Pentium III with 512MB RAM Diamond Viper V770 for Windows 98 Video card w/32MB video memory

DAQ Board Specifications

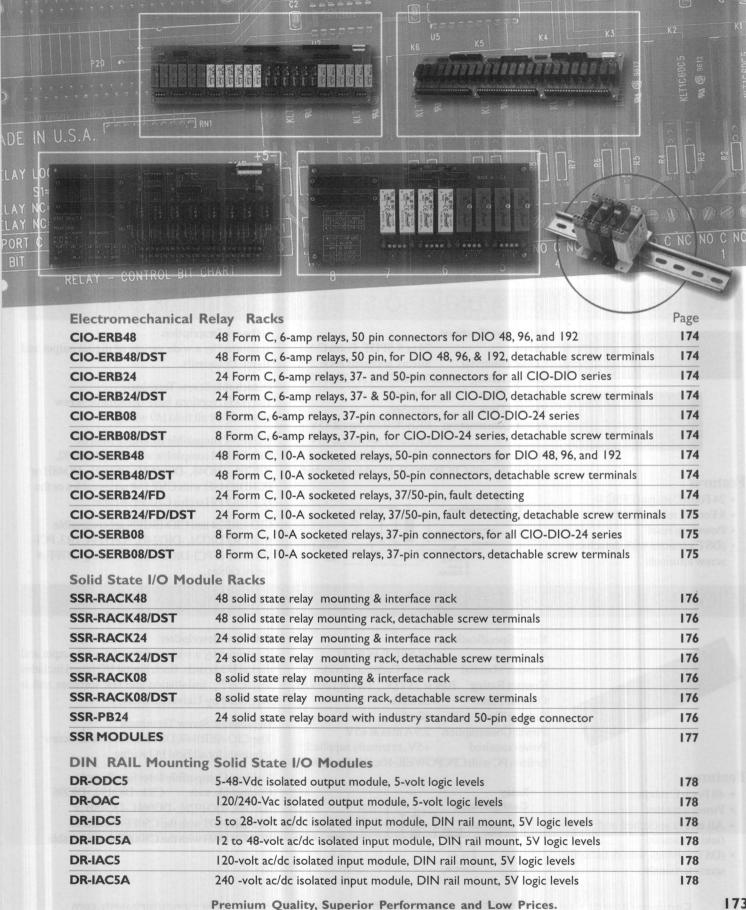
PCI-DAS1602/16 (See pages 43-46) Maximum Analog Input Scan rate: 200kHz Maximum Analog Output Scan rate: 100kHz per channel

For more information on **SoftWIRE**, please see pages 6–10 in this catalog or visit **www.computerboards.com/softwire**



Graphical Programming in Visual Basic®

Digital Signal Conditioning



CIO-ERB24, CIO-ERB24/DST, CIO-ERB08 & CIO-ERB08/DST





Relay Specifications

24 or 8 SPDT, Form C Relays Contact Material Silver Cadmium Oxide Contact Rating 6A at 28VDC, 5A at 120VAC

Operate Time 20mSec. Release Time 10mSec.

Power Consumption ERB08: 0.5A max at +5V

ERB24: 1.4A max at +5V

Power required +5V, externally supplied or from PC with CPCPOWER-10 cable (included)

Relay Configuration BUFFER 2.2K PULL

Software Description

Supported by a wide variety of digital output and digital I/O boards.

Detachable Screw Terminals

The /DST versions have detachable screw terminals for all field I/O wiring.

Cables / Compatible Interface Boards CIO-ERB24 compatible with: CIO-DIO192, -DIO96, -DIO48, -DO192H, -DO96H, -DO48H or PCI-DIO48H with C50FF-# series cables or the PCI-DIO96H with a C100FF-# cable

CIO-ERB24 and CIO-ERB08 are compatible with CIO-DIO24, -DIO24H, -DIO24/CTR3, PCI-DIO24H & PCI-DIO34H/CTR3 using C37FF-# series cables.

Features

- 24 Form C relays (ERB24)
- 8 Form C relays (ERB08)
- · Power-on reset
- /DST versions with detachable screw terminals

CIO-SERB48 & CIO-SERB48/DST

10 Amp Socketed Relays!



Features

- 48 Form C relays
- Power-on reset
- All relays socketted and field replacable
- /DST versions with detachable screw terminals

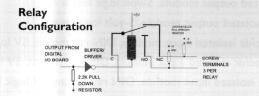
Relay Specifications

Relays 48 SPDT, FORM C Contact Material Silver Cadmium Oxide Contact Rating 10A at 28VDC, 10A at 120VAC

Operate Time 20mSec. Release Time 10mSec.

Power Consumption 2.9 A max at +5V

Power required +5V, externally supplied or from PC with CPCPOWER-10 cable (included)



Software Description

Supported by a wide variety of digital output and digital I/O boards. Each digital I/O board includes InstaCalTM, installation and test software and is supported by Universal LibraryTM.

Detachable Screw Terminals

The CIO-SERB48/DST has detachable screw terminals for all field I/O wiring.

Cables / Compatible Interface Boards Compatible with: CIO: -DIO192, -DIO96 -DIO48, -DO192H, -DO96H, -DO48H or PCI-DIO48H with the C50FF-# cable or PCI-DIO96H with the C100FF-# series cable

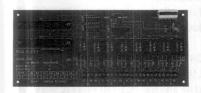
- field replacable
- /DST versions provide detachable screw terminals

other 24-bits are configured as inputs and are used to monitor the relay coil status.

unrough COUFF-# cables and the PCI-DIO96H with the C100FF-# series cable

CIO-SERB08 & CIO-SERB08/DST

10 Amp Socketed Relays!



Features

· 8 Form C relays

· Power-on reset

field replacable

screw terminals

All relays socketted and

/DST versions with detachable

Relay Specifications
Relays 8 SPDT, FORM C
Contact Material Silver Cadmium Oxide
Contact Rating 10A at 28VDC, 10A at 120VAC

Operate Time 20mSec. Release Time 10mSec.

Power Consumption 2.9 A max at +5V

Power required +5V, externally supplied or from PC with CPCPOWER-10 cable (included)

Relay Configuration OUTPUT FROM DISTRICT ORIVER OR

Software Description

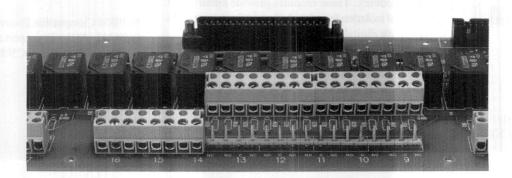
Supported by a wide variety of digital output and digital I/O boards. Each digital I/O board includes *Insta*CalTM, installation and test software and is supported by Universal LibraryTM.

Detachable Screw Terminals

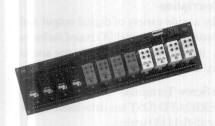
Th /DST suffix indicates the board has detachable screw terminals for all field I/O wiring.

Cables / Compatible Interface Boards
Compatible with: CIO: -DIO24, -DIO24H,
-DIO24/CTR3, DO24, and the PCI-DIO24H DIO24H/CTR3 with a C37FF-# series cable.

Add a /DST suffix and add detachable screw terminals!



SSR-RACK48 & SSR-RACK48/DST



Features

- 48 channel solid-state relay module rack
- Uses industry standard quad-format modules
- · Very high density

Description

The SSR-RACK48 is a high density mounting and interface rack for use with quad type solid state relays. The SSR-RACK48 is the perfect means of interfacing quad solid state relays (SSR) modules to any 48, 96 or 192 line digital I/O board with 50 pin connectors.

Providing positions for 12 quad relays, the SSR-RACK48 has screw terminals for each module. The screw terminals allow you to connect signals via 12-22 AWG wire. The signals are routed through the SSRs to the 50 pin, 48 line connector.

Power Requirements

+5V, externally supplied or from PC with CPCPOWER-10 cable (included)

I/O Modules

Please refer to page 177 for further details on the types available and the specifications of our quad SSR modules.

Detachable Screw Terminals
The SSR-RACK48/DST has detachable screw terminals for all field I/O wiring.

Compatible Interface Boards
CIO-ERB48 (/DST) is compatible with the CIO-DIO48/96/192, CIO-DIO48H and PCI-DIO48H through C50FF-# cables and the PCI-DIO96H with the C100FF-# series cable

SSR-RACK24, SSR-RACK24/DST, SSR-RACK08 & SSR-RACK08/DST





Features

- 24 or 8 channel solid-state relay module racks
- Uses industry standard I/O modules

Description

The SSR-RACK24 and SSR-RACK08 are mounting and interface racks for use with standard size Gordos/OPTO22 solid state I/O modules. These modules provide hundreds of volts of isolation from harsh electrical environments for both digital inputs and outputs.

The SSR-RACK24 and SSR-RACK08 have independent screw terminals for each module. The screw terminals allow you to connect signals via 12-22 AWG wire.

I/O Modules

Please refer to page 177 for further details on the types available and the specifications of our standard SSR modules.

Power Requirements

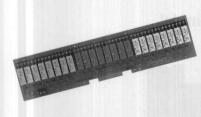
+5V, externally supplied or from PC with CPCPOWER-10 cable (included)

SSR-RACK24 Compatible Boards & Cables CIO-DIO192, 96, 48, CIO-DO192, 96, 48, and CIO-DI192, 96 and 48 and the PCI-DIO48H & 96H with C50FF-# cables.

The CIO-DIO24, -DIO24H -DIO24/CTR3 and PCI-DIO24H and -DIO24H/CTR# require C37FF-# series cables.

SSR-RACK08 Compatible Boards & Cables is compatible with the CIO-DIO24, -DIO24H and -DIO24/CTR3 and PCI-DIO24H, and DIO24h/CTR3 with a C37FF-# series cable.

SSR-PB24



Features

- 24 channel solid-state relays
- Industry standard 50-pin edge connector
- Uses industry standard I/O modules

Description

The SSR-PB24 is a mounting and interface rack for use with standard size Gordos/OPTO22 solid state I/O modules. These modules provide hundreds of volts of isolation from harsh electrical environments for both digital inputs and outputs.

The SSR-PB24 provides independant screw terminals for each module. The screw terminals allow you to connect signals via 12-22 AWG wire.

I/O Modules

Please refer to pages 177 for further details on the types available and the specifications of our standard SSR modules.

Power Requirements

+5V, externally supplied or from PC with CPCPOWER-10 cable (included)

SSR-PB24 Compatible Boards & Cables CIO-DUAL-AC5 will support two SSR-PB24 racks. Each will require a C50FE-# series cable.

RELAY & SOLID STATE I/O MODULE RACKS

SSR MODULES



Single DC Input & Output

SSR-ODC-05

0 to 60

Specification (Out)

Load Voltage

QUAD DC Input & Output

SSR-4-ODC-05A

5 to 200

SSR-4-ODC-05

3 to 60

Load Current Max	3.5 Amps	l Amp	3.0 Amps	I Amp
Power Dissipation	1W/Amp	1.5 W/Amp	1W/Amp	1.5 W/Amp
Clamping Voltage	108 VDC	360 VDC	108 VDC	360 VDC
Turn-On-Time	20uS	75uS	50uS	50uS
Turn-Off-Time	50uS	750uS	100uS	100uS
Off Leakage Current	1.5 mA	10uA	1.0mA	2mA
On Voltage Drop	1.2 VDC	1.75VDC	1.5VDC	1.6VDC
Logic Supply Current	14mA	18uA	10mA	10mA
Specification (In)	SSR-IDC-05	SSR-IDC-05NP	SSR-4-IDC-05	SSR-4-IDC-05NP
Input Voltage	3 to 32	10 to 32 VDC	3.3 to 32	10 to 32 VDC
		15-32 VAC Rms	and the second second second	10-60 V Rms
Input Current Max	18mA	25 mA	32mA	30mA
Input Resistance	1.8K Ohm	1.8K Ohms	1.8K Ohm	1.8K Ohms
Breakdown Voltage	50 VDC	50 VDC	50 VDC	50 VDC
Turn-On-Time	0.20mS	5mS	300uS	20mS
Turn-Off-Time	0.40mS	5mS	600uS	30mS
Logic Supply	10mA	10mA	10mA	10mA

SSR-ODC-05A

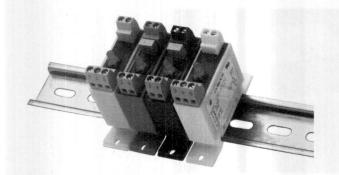
0 to 200

Single AC Input & Output

QUAD AC Input & Output

Specification (Out)	SSR-OAC-05	SSR-OAC-05A	SSR-4-OAC-05	SSR-4-OAC-05A
Load Voltage	24 to 140	24-280	12 to 140 VRMS	24 to 280 VRMS
Load Current Max	3.5 Amps	3.5 Amps	3.0 Amps	3.0 Amps
Power Dissipation	1W/Amp	1W/Amp	1W/Amp	1 W/Amp
Blocking Voltage	400 VDC	600 VDC	400 VDC	600 VDC
Turn-On-Time	8.3 mS	8.3 mS	1/2 cycle	1/2 cycle
Turn-Off-Time	8.3 mS	8.3 mS	1/2 cycle	1/2 cycle
Off Leakage Current	2 mA, RMS	4 mA, RMS	2.5 mA rms	4.5 mA rms
Frequency Range	25Hz to 70Hz	25Hz to 70Hz	47 Hz to 63 Hz	47Hz to 63Hz
Logic Supply Current	16mA	16mA	10mA	10mA
Specification (In)	SSR-IAC-05	SSR-IAC-05A	SSR-4-IAC-05	SSR-4-IAC-05A
Input Voltage	90 to 140 VAC	180 to 280 VAC	90 to 140 VAC	180 to 280 VAC
Input Current Max	8 mA, RMS	6mA rms	10 mA	8mA
Input Resistance	22K Ohm	60K Ohms	14K Ohm	45K Ohms
Breakdown Voltage	50 VDC	50 VDC	50 VDC	50 VDC
Гurn-On-Time	20mS	20mS	20mS	20mS
Turn-Off-Time	20mS	20mS	30mS	30mS
Logic Supply Current	10mA	10mA	10mA	10mA

DIN Rail Mountable SSR MODULES



Features

- · Electrically equivalent to industry standard IAC/IDC/OAC & ODC solid state series
- · Convenient DIN Rail mounting
- · Status LEDs show module condition
- · Low Cost
- · Ideal for use with CB COM series, or any digital I/O board when a few high voltage/current points must be monitored and/or controlled.

Specification	DR-ODC5
Load Voltage	4 to 48 V
Load Cument May	2 1

DC OUPUT MODULES

to 48 V 3 Amps Load Current Max 60 VDC Max Line Voltage 1.5 VDC, max On Voltage Drop Off Leakage Current 10 uA Module Fuse rating 5 A* Turn-On-Time 100uS Turn-Off-Time 750uS I/O Isolation Voltage 4000 VAC

Control On Voltage required Control On Current required Control Off voltage **Operating Temp**

3.5 VDC, min 18.0 mA, max 1 VDC, max -30 to 80 °C

ACOUPUT MODULES

Specification DR-OAC Load Voltage 120 or 240 VAC Load Current Max 5 Amps Max Line Voltage 280 VAC On Voltage Drop 1.6 VAC, max Off Leakage Current 6 mA rms Module Fuse rating* 5 A Turn-On-Time 8.33 mS Turn-Off-Time 8.33 mS Allowable Frequency Range 47 to 63 Hz I/O Isolation Voltage 4000 VAC

Control On Voltage required 3.7 VDC, min 32 VDC, max Control On Current required 18.0 mA, max Control Off voltage 1 VDC, max **Operating Temp** -30 to 80 °C

DCINPUTMODULES

DC INI OT MODULES		
Specification	DR-IDC5	DR-IDC5A
Input Voltage	5-28 VDC	12 to 48 VDC
Maximum Voltage	32 VDC/VAC	48 VDC
Minimun On Voltage	4 VDC	10 VDC
Maximum Off Voltage	1 VDC	4.0 VDC
Input Current Max	34 mA	34 mA
Input Resistance	1.0 K Ohm	2.0 K Ohms
Turn-On-Time	1.0 mS	1.0 mS
Turn-Off-Time	1.0 mS	1.0 mS
I/O Isolation Voltage	4000 VAC	4000 VAC
Logic Supply Range	3.0 to 6.0 V	3.0 to 6.0V
Max Logic Supply Current	28 mA	28 mA
Logic Output High Level	0.2 VDC, max	0.2 VDC, max
Logic Output Drive Current	50 mA, min	50 mA, min
Operating Temp	-30 to 80 °C	-30 to 80 °C

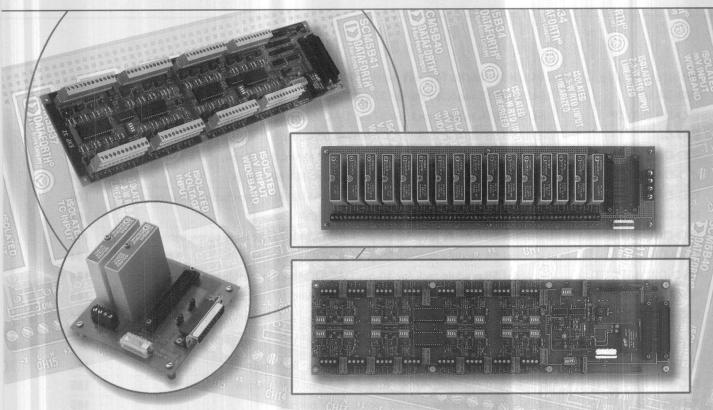
*5A fuse, BUSS model PC-TRON #PCE5

AC/DC INPUT MODULES

Specification	DR-IAC5	DR-IAC5A
Input Voltage	120 VAC/VDC	240 VAC/VDC
Maximum Voltage	140 VAC/VDC	280 VAC/VDC
Minimun On Voltage	90 VAC/VDC	180 VAC/VDC
Maximum Off Voltage	50 VAC/VDC	50 VAC/VDC
Input Current Max	5.0 mA	5.0 mA
Input Resistance	28 K Ohm	75 K Ohms
Turn-On-Time	20 mS	20mS
Turn-Off-Time	30 mS	30mS
Allowable Frequency Range	0 to 63 Hz	0-63 Hz
I/O Isolation Voltage	4000 VAC	4000 VAC
Logic Supply Range	3.0 to 6.0 V	3.0 to 6.0V
Max Logic Supply Current	28 mA	28 mA
Logic Output High Level	0.2 VDC, max	0.2 VDC, max
Logic Output Drive Current	50 mA, min	50 mA, min
Operating Temp	-30 to 80 °C	-30 to 80 °C

^{*5}A fuse, BUSS model PC-TRON #PCE5

Analog Signal Conditioning



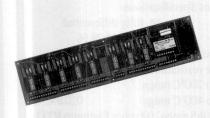
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ANALOG SIGNAL CONDITIONING & EXPANSION

CIO-SSH16 & CIO-SSH16/DST



Adds simultaneous sample &

hold front end to A/D board

expandable to 16 channels

Compatible with CIO-DAS1600

-DAS1400 and -DAS16 families

· 4 channels standard,

Features

Analog Input Specifications

Aperture time 175nS avg, 250nS max Aperture uncertainty ±25 nS

Acquisition time 4 uS
Max sample rate 250 KHz
Droop rate ±100 uV/mS

Input gains 1, 10, 100, 200, 300, 500

600, 700 and 800

Gain selection Switch selectable. Channels

may be at different gains.

Accuracy 0.01% ±1-bit

Channels

4 standard, up to 16 total. Additional channels may be added by purchasing/installing the CIO-SSH-AMP part. Each SSH-AMP adds one channel.

Software Description

Includes *Insta*CalTM, installation, calibration and test software. The CIO-SSH16 is supported by the UniversalLibraryTM for use with the DAS-16, DAS-1600 and DAS-1400 families. UniversalLibraryTM (provides programming language support for all DOS and Windows languages). Also supported by many third party, high-level data acq. programs.

Ordering Information

CIO-SSH16 4 channel SSH board
CIO-SSH16/DST w/ detachable screw terms.
1 channel expansion (you may add up to 12 channels)

Interconnect Cables

Standard: C37FF-# series Shielded: C37FFS-5, C37FFS-10

CIO-EXP-32, CIO-EXP-32/DST, CIO-EXP-16 & CIO-EXP-16/DST





A/D board channel expansion

32 channel (EXP-32)

16 channel (EXP-16)

User selectable gains

On-board CJC sensor

Analog Input Specifications

Channels 32, CIO-EXP-32, differential 16, CIO-EXP-16, differential

Gain weights 1, 10, 100, 200, 300, 500 CJC sensor +24.4 mV/°C (0V at 0°C)

User Field Configurable Options
Input filters (7 Hz), Open Thermocouple detection,
10Kohm ground reference resistor.

Cascading with the EXP-16 & EXP-32



128 CHANNELS TOTAL WITH CIO-DAS08 256 CHANNELS WITH CIO-DAS16

FIRST CABLE IN SERIES IF A/D BOARD IS DAS16 MUST BE C-MUXAD16-10 FOR DAS08 ANY 1:1 37 PIN

Software Description

Includes *Insta*Cal[™], installation, calibration and test software. The CIO-EXP series is supported by the UniversalLibrary[™] for use with most A/D boards.

/DST versions provide all field I/O wiring through detachable screw terminals.

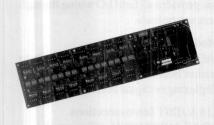
Operating Modes

The active EXP-32/16 channel is selected by the host A/D board's digital output. An A/D board analog input must be dedicated to each EXP board.

Interconnect Cables

DAS-800/8 series C37FF-# series DAS-1600/1400/16 series C-EXP2DAS16-10

CIO-EXP-BRIDGE16 & CIO-EXP-BRIDGE16/DST



Features

Features

- 16 chan., A/D board expansion
- · Ideal strain gauge interface
- On-board Wheatstone bridge circuitry
- User selectable gains

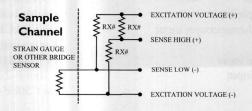
Analog Input Specifications

Channels 16, fully differential Gains 1, 10, 100, 1000

Field Installable Precision Resistors

It is critical that you use high quality resistors. We offer these values that match many sensors CIO-EXP-RES-120 120 Ohm, 5ppm, 0.1%

CIO-EXP-RES-350 350 Ohm, 5ppm, 0.1% CIO-EXP-RES-1000 1000 Ohm, 5ppm, 0.1%



Software Description

Includes *Insta*CalTM, installation, calibration and test software. The CIO-EXP series is supported by the UniversalLibraryTM for use with most A/D boards.

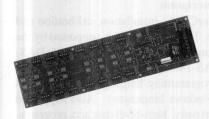
/DST version provides all field I/O wiring through detachable screw terminals.

Operating Modes

The active EXP-BRIDGE16 channel is selected by the host A/D board's digital output. An A/D board analog input must be dedicated to each EXP board.

Interconnect Cables

CIO-EXP-RTD16 & CIO-EXP-RTD16/DST



Software Description

Includes *Insta*CalTM, installation, calibration and test software. The CIO-EXP series is supported by the Universal LibraryTM for use with most A/D boards.

/DST version provides all field I/O wiring through detachable screw terminals.

Analog Input Specifications Channels 16, fully

Channels 16, fully differential Gains 1,2,4,7,8,14,28,56

Excitation current 1 mA

Temperature resolution: (12-bit A/D board)
-200°C to 200°C range
-200°C to 400°C range
0.218°C
assumes .00385 alpha, 100 ohm Platinum RTD.

Features

- 16 chan., RTD expansion board
- 2-, 3- and 4-wire RTD support
- · On-board excitation current
- · User selectable gains

Connection Diagrams 3 WIRE RTD CIO-EXP-RTDI6 BOARD 2 WIRE EXCITATION CURRENT (+) SENSE HIGH (+) SENSE LOW (-) EXCITATION CURRENT (-) SENSE LOW (-) EXCITATION CURRENT (-)

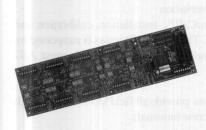
Operating Modes

The active EXP-RTD channel is selected by the host A/D board's digital output. An A/D board analog input must be dedicated to each EXP board.

Interconnect Cables

DAS-800/8 series C37FF-# series DAS-1600/1400/16 series C-EXP2DAS16-10

CIO-EXP-GP & CIO-EXP-GP/DST



• 8 chan., A/D board expansion

On-board cold-junction sensor

· On-board Wheatstone bridge

Analog Input Specifications

Channels 8, fully differential Gains 1, 10, 100, 1000

CJC sensor +24.4 mV/°C (0V at 0°C) Thermoucouples supported, J,K,T,E,S,R,B Typical Thermocouple accuracy: ±2°C

RTD types 2, 3, and 4 wire supported

Typical RTD accuracy: ±.5°C

Software Description

Includes *Insta*CalTM, installation, calibration and test software. The CIO-EXP series is supported by the Universal LibraryTM for use with most A/D boards.

/DST version provides all field I/O wiring through detachable screw terminals.

Field Installable Precision Resistors

The EXP-GP provide locations to install bridge completion resistors for Wheatston bridge applications. Resistor quality is critical for good results. We offer these values that match many sensors

CIO-EXP-RES-120 120 Ohm, 5ppm, 0.1% CIO-EXP-RES-350 350 Ohm, 5ppm, 0.1% Operating Modes
The active EXP-G

The active EXP-GP channel is selected by the host A/D board's digital output. An A/D board analog input must be dedicated to each EXP-GP board.

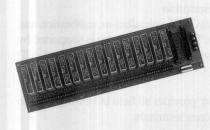
Inteconnect Cables

DAS-800/8 series C37FF-# series DAS-1600/1400/16 series C-EXP2DAS16-10

circuitryUser selectable gains

Features

• User selectable gains CIO-EXP-RES-1000 1000 Ohm, 5ppm, 0.1% ISO-RACK16, ISO-RACK16/DST, ISO-RACK16/P, & ISO-RACK16/P/DST



Analog Input Specifications

Channels 16

Module isolation 1500Vrms

Input filtering 4Hz (standard module) 10 KHz (high speed)

Module types (see pages 185-186 for details)

Voltage input

High speed voltage input (10 KHz)

Current input

Thermocouple input

Linearized thermocouple input

RTD input

Strain gauge input

Frequency input

/DST version provides all field I/O wiring through detachable screw terminals.

Operating Modes

Each ISO-RACK16 module is connected directly to a data acquisition board analog input. There is no external multiplexing or digital control required.

ISO-RACK16 & /DST Inteconnections

For use with DAS-1600/1400/16 series, use the C37FF-# series cable or the C37FFS-5, -10

shielded cables (recommended)

ISO-RACK16/P & /P/DST Inteconnections

For use with the PCI-DAS1600, PCI-DAS1200, PCI-DAS1000, and CIO-DAS6400 series use the

C100FF-2 (for boards with 100 pin connecters) or the C50FF-2 for boards with 50-pin connectors).

Features

- Provides 16 isolated channels
- 5B modules provide a wide variety of signal conditioning
- Sensor/module types may be mixed on a single board

inteconnect Capies

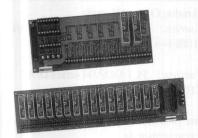
 Sensor/module types may be mixed on a single board

• DAS-8 and DAS-16 compatible

Frequency input

DAS-800/8 series: C37FF-# series C37FFS-5, -10 shielded cables (recommended) DAS-1600/1400/16 series CEXP2DAS16-10

ISO-DA16, ISO-DA16/DST, ISO-DA08 & ISO-DA08/DST



Features

- DA16 series provides 16 isolated analog output channels
- DA8 series provides 8 isolated analog output channels
- Compatible with populare CIO-DAC series D/A boards

Analog Output Specifications

Channels

16:

ISO-DA16 series

ISO-DA08 series

Module types Compatible with ISO-5B49 series described on page 185-186.

General Module Specifications

Isolation

1500 Vrms

Bandwidth

400 Hz

Output ranges

 $0-5, \pm 5, 0-10$ and ± 10 VDC

Output drive

50 mA max

Output resistance

0.5 ohm Output accuracy ±0.05% at 0-5 mA

Output noise

±2 mVp-p

Compatible Analog Output Boards

ISO-DA16 series:

CIO-DAC16/16 and the

CIO-DAC16 via C37FF-# and C37FFS-# cables

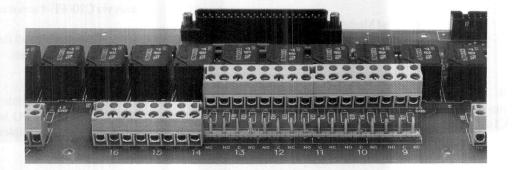
ISO-DA08 series: CIO-DAC08/16 and the CIO-DAC08 via C37FF-# and C37FFS-# cables

/DST versions provide all field I/O wiring through detachable screw terminals.

Operating Modes

Each ISO-DA series module is connected directly to a D/A board's analog output. There is no external multiplexing or digital control required.

Add a /DST suffix and add detachable screw terminals!



ISO-DA02 & ISO-DA02/DST



Features

- · Provides 2 isolated analog output channels
- · Compatible with CIO-DAC02 and CIO-DAS16/1600 series

Analog Output Specifications

Channels

Module types Compatible with ISO-5B49 series described on page 185-186.

General Module Specifications

Isolation Bandwidth

1500 Vrms 400 Hz

Output ranges

 $0-5, \pm 5, 0-10$ and ± 10 VDC

Output drive Output resistance

50 mA max 0.5 ohm

Output accuracy

±0.05% at 0-5 mA

Output noise

±2 mVp-p

Compatible Analog Output Boards

CIO-DAC02/16, CIO-DAC02, via C25FM-#

cables

CIO-DAS1600/16 series analog I/O boards via C37FF-# and C37FFS-# cables

/DST versions provide all field I/O wiring through detachable screw terminals.

Operating Modes

Each ISO-DA series module is connected directly to a analog output or I/O board's analog ouput. There is no external multiplexing or digital control required.

ISO-DA08/P, ISO-DA08/P/DST, ISO-DA04/P & ISO-DA04/P/DST





Features

- · DA08 series provides 8 isolated analog output channels
- DA4 series provides isolated analog output channels
- Compatible with popular PCI-DDA series D/A boards

Analog Output Specifications

Channels

ISO-DA08/P series 8:

ISO-DA04/P series

Module types Compatible with ISO-5B49 series described on page 185-186.

General Module Specifications

Isolation

1500 Vrms

Bandwidth

400 Hz

Output ranges Output drive

 $0-5, \pm 5, 0-10$ and ± 10 VDC

Output resistance

50 mA max 0.5 ohm

Output accuracy

±0.05% at 0-5 mA

Output noise

±2 mVp-p

Compatible Analog Output Boards

ISO-DA08/P series: PCI-DDA08 series D/A

boards via C100FF-# series cables

ISO-DA04/P series: PCI-DDA04 series D/A boards via C100FF-# series cables

/DST versions provide all field I/O wiring through detachable screw terminals.

Operating Modes

Each ISO-DA series module is connected directly to a D/A board's analog output. There is no external multiplexing or digital control required.

ISO-DA02/P & ISO-DA02/P/DST



Features

- Provides 2 isolated analog output channels
- Compatible with PCI-DDAC02 and PCI-DAS series boards

Analog Output Specifications

Channels

Module types Compatible with ISO-5B49 series

described on page 185-186.

General Module Specifications

Isolation Bandwidth 1500 Vrms 400 Hz

Output ranges

 $0-5, \pm 5, 0-10$ and ± 10 VDC

Output drive

50 mA max

Output resistance

0.5 ohm

Output accuracy ±0.05% at 0-5 mA

Output noise

±2 mVp-p

Compatible Analog Output Boards

PCI-DDA02 series boards via C100FF-# series cables

PCI-DAS6400/1600/1200/1000 series analog I/O boards via C100FF-# series cables

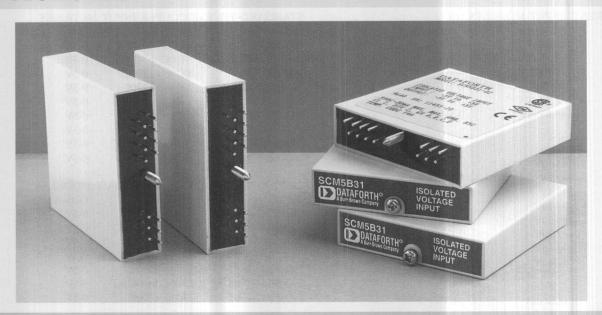
/DST versions provide all field I/O wiring through detachable screw terminals.

Operating Modes

Each ISO-DA series module is connected directly to a analog output or I/O board's analog ouput. There is no external multiplexing or digital control required.

ANALOG SIGNAL CONDITIONING & EXPANSION

ISO MODULES



Specification Type	5B30 Voltage	5B31 Voltage	5B40 Voltage 10Khz	5B41 Voltage 10KHz	5B37 TC	5B47 Linear TC	5B32 Current	5B34 RTD
Accuracy			200200				DA SELECTION	
+/-0.05% Span Nonlinearity	+/-10uV RTI +/-0.02% Span	+/-0.2mV RTI Same	+/-10uV RTI Same	+/-0.05mV RTI Same	+/-10uV RTI Same	See Module specs	+/-0.05% Same	+/-0.88°C
Stability vs Ambient Ter								
Input Offset Output Offset Gain Input Bias Current	+/-1uV/°C +/-20uV/°C +/-25ppm/°C +/-0.5nA	+/-20u V/°C +/-20u V/°C +/-50ppm /°C +/-0.05nA	+/-1uV/°C +/-40uV/°C +/-25ppm/°C +/-0.5nA	+/-20uV/°C +/-40uV/°C +/-50ppm/°C +/-0.05nA	+/-1uV/°C +/-20uV/°C +/-25ppm/°C -25nA	+/-1uV/°C +/-20uV/°C +/-25ppm/°C -25nA	+/-50nA/°C +/-20uV/°C +/-0.25ppm/°C	+/-0.02dC/°C +/-20uV/°C +/-50ppm/°C
Input Resistance Normal Power Off Overload	50M Ohm 40K Ohm 40K Ohm	650K Ohm 650K Ohm 650K Ohm	200M Ohm 40K Ohm 40K Ohm	650K Ohm 650K Ohm 650K Ohm	5M Ohm 40K Ohm 40K Ohm	5M Ohm 40K Ohm 40K Ohm		5M Ohm 40K Ohm 40K Ohm
Noise								
Input 0.1-10 Hz Output 100 Khz Output Resistance Bandwidth, -3dB Response to 90% Span Voltage Ouput Protection	0.2uVrms 200uVrms 50 Ohm 4 Hz 0.2S	2u Vrms 200uVrms 50 Ohm 4Hz 0.2S Cont. Short	0.4 uVrms 10m V P-P 50 Ohm 10KHz 40uS Cont. Short	2uVrms 10mV P-P 50 Ohm 10KHz 35uS Cont. Short	0.2u Vrms 200u Vrms 50 Ohm 4Hz 0.2S Cont. Short	0.2uVrms 500uVrms 50 Ohm 4Hz 0.2S Cont. Short	10nArms 10uVrms 50 Ohm 4Hz 0.2S Cont. Short	0.2u Vrms 200u Vrms 50 Ohm 4Hz 0.2S Cont. Short
Common Mode Specs	1,500.	150011	150017	1.50037	1.50037	1500 11	150017	150037
CMV Input to Output CMR at 50 or 60 Hz NMR at 50 or 60 Hz CJC	1500Vrms 160dB 90db/95db	1500Vrms 160dB 90db/95db	1500Vrms 100dB	1500Vrms 100dB	1500Vrms 90dB 90db/95db	1500 Vrms 160dB 90db/95db	1500Vrms 160dB 90db/95db	1500Vrms 160dB 90db/95db
Initial Accuracy Over +5 Deg C to +45 d Open Input Detect Tim Input Resistor - Value Sensor Excitation Curre 10 Ohm Cu.	e	120 Ohm Ni			+/-0.25Deg C +/-0.5Deg C 10S 20.00 Ohm	+/-0.25 Deg C +/-0.5 Deg C 10S 20.00 Ohm		0.25mA 1.0 mA

All Models

Power Consumption 150mW(30MA)
Power Supply Voltage +5V +/-5%

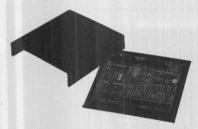
Relative Humidity 0-95% Non Condensing Environmental - Op. Tem₂5 Deg C to 85 Deg C Storage Temperature -40 Deg C to 85 Deg C

RFI Susceptibility +/-0.5% of Full Scale at 400 MHz at 5W from 3'

ISO-5B MODULES

VOLTATE/CURRI	ENT INPUT MODU	LES (4HZ)	STANDARD THERM	OCOUPLE INPUT	MODULES
part number	Input range	Output range	part number	Input range	Output range
ISO-5B30-01	+/-10mV	+/-5V	ISO-5B37-J	-100C to +760C	0-5V
ISO-5B30-02	+/-50mV	+/-5V	ISO-5B37-K	-100C to +1350C	0-5V
ISO-5B30-03	+/-100mV	+/-5V	ISO-5B37-B	0C to +1800C	0-5V
ISO-5B30-04	+/-10mV	0-5V	ISO-5B37-R	0C to +1750C	0-5V
ISO-5B30-05	+/-50mV	0-5V	ISO-5B37-T	-100C to +400C	0-5V
ISO-5B30-06	+/-100mV	0-5V	ISO-5B37-E	0C to +900C	0-5V
150-5050-00	+/-100III v	0-3 v	ISO-5B37-S	0C to +1750C	0-5V
ISO-5B31-01	+/-1V	+/-5V	ISO-5B37-C	+350C to 1300C	0-5V
ISO-5B31-02	+/-5V	+/-5V		-100 to 1300C	0-5V
ISO-5B31-03	+/-10V	+/-5V	ISO-5B37-N	-100 to 1500C	0-3 V
ISO-5B31-04	+/-1V	0-5V	I DIE I DIZED THED	ACCOUNT E INDU	E MODIII EG
ISO-5B31-05	+/-5V	0-5V	LINEARIZED THERM		
ISO-5B31-06	+/-10V	0-5V	part number	Input range	Output range
ISO-5B31-07	+/-20V	+/-5V	ISO-5B47-J-01	0C to +760C	0-5V
ISO-5B31-07	+/-20V	0-5V	ISO-5B47-J-02	-100C to $+300C$	0-5V
ISO-5B31-09	+/-40V	+/-5V	ISO-5B47-J-03	0C to $+500C$	0-5V
ISO-5B31-09	+/-40V +/-40V	0-5V	ISO-5B47-K-04	0C to +1000C	0-5V
130-3631-10	+/-40 V	0-3 V	ISO-5B47-K-05	0C to +500C	0-5V
ISO-5B32-01	4-20 mA	0-5V	ISO-5B47-T-06	-100C to +400C	0-5V
ISO-5B32-02	0-20 mA	0-5V	ISO-5B47-T-07	0C to +200C	0-5V
150-3032-02	0-20 IIIA	0- <i>3</i> ¥			
VOLTAGE INPUT	Γ MODULES (10KH	z)	ISO-5B47-E-08	0C to +1000C	0-5V
part number	Input range	Output range	ISO-5B47-R-09	+500C to +1750C	0-5V
ISO-5B40-01	+/-10mV	+/-5V	ISO-5B47-S-10	+500C to +1750C	0-5V
ISO-5B40-01	+/-50mV	+/-5V	ISO-5B47-B-11	+500C to +1800C	0-5V
ISO-5B40-02	+/-100mV	+/-5V	ISO-5B47-J-12	-100C to +760C	0-5V
ISO-5B40-04	+/-100mV	0-5V	ISO-5B47-K-13	-100C to +1350C	0-5V
ISO-5B40-04 ISO-5B40-05	+/-50mV	0-5V	ISO-5B47-K-14	0C to +1200C	0-5V
ISO-5B40-05	+/-100mV	0-5V	ISO-5B47-N-15	-100C to +1300C	0-5V
130-3640-00	+/-100III v	0-3 V	130-3647-11-13	-100C to +1500C	0-3 V
ISO-5B41-01	+/-1V	+/-5V	RTD INPUTS - LINEA	ARIZED (all models	0-5 V output)
ISO-5B41-02	+/-5V	+/-5V	part number	Input range	RTD Type
ISO-5B41-03	+/-10V	+/-5V	ISO-5B34-01	-100C to +100C	Platinum 100 Ohm
ISO-5B41-04	+/-1V	0-5V	ISO-5B34-02	0C to +100C	Platinum 100 Ohm
ISO-5B41-05	+/-5V	0-5V	ISO-5B34-02	0C to +200C	Platinum 100 Ohm
ISO-5B41-06	+/-10V	0-5V	ISO-5B34-04	0C to +600C	Platinum 100 Ohm
ISO-5B41-07	+/-20V	+/-5V	ISO-5B34-C-01	0C to +120C	Copper 10 Ohm @18C
ISO-5B41-08	+/-20V	0-5V			Copper 10 Ohm @25C
ISO-5B41-09	+/-40V	+/-5V	ISO-5B34-C-02	0C to +120C	* *
ISO-5B41-10	+/-40V	0-5V	ISO-5B34-N-01	0C to + 300C	Nickel 120 Ohm
			PASS THROUGH MC	DITE NO ISOL	ATION
	NPUT MODULES (1		ISO-5B-DS	DOLL - NO ISOLA	THON
part number	Module Descrip		13O-3B-D3		
ISO-5B38-01		3mV/V) 100 to 10KOhm	OUTDUTMODI	H EC	
ISO-5B38-02	Full, (10.0V @ 3	3mV/V) 300 to 10KOhm	OUTPUT MODU		
ISO-5B38-03	Half, (3.333V @	3mV/V) 100 to 10KOhm	CURRENT OUTPUT	MODULES (400H	Z)
ISO-5B38-04	Half, (10.0V@:	3mV/V) 300 to 10KOhm	part number	Input range	Output range
ISO-5B38-05	Full, (10.0V@2	2mV/V) 300 to 10KOhm	ISO-5B39-01	0-5V	4-20 mA
ISO-5B38-06	Full, (3.333V @	10mV/V) 100 to 10KOhm	ISO-5B39-02	+/-5V	4-20 mA
ISO-5B38-07		10mV/V) 300 to 10KOhm	ISO-5B39-03	0-5V	0-20 mA
			ISO-5B39-04	+/-5V	0-20 mA
FREQUENCY IN	PUT MODULES				
part number	Input range	Output range	VOLTAGE OUTPUT	MODULES (400H	Z)
ISO-5B45-01	0 to 500Hz	0-5V	part number	Input range	Output range
ISO-5B45-02	0 to 1KHz	0-5V	ISO-5B49-01	0-5V	+/-5V
ISO-5B45-03	0 to 3KHz	0-5V	ISO-5B49-02	+/-5V	+/-5V
ISO-5B45-04	0 to 5KHz	0-5V			
ISO-5B45-05	0 to 10KHz	0-5V	ISO-5B49-03	+/-5V	0-5V
ISO-5B45-06	0 to 25KHz	0-5V	ISO-5B49-04	0-10V	+/-10V
ISO-5B45-07	0 to 50KHz	0-5V	ISO-5B49-05	+/-10V	+/-10V
ISO-5B45-07 ISO-5B45-08	0 to 100KHz	0-5V	ISO-5B49-06	+/-10V	0-10V
ISO-5B45-09	0 to 250KHz	0-5V	ISO-5B49-07	+/-5V	+/-10V
100-3043-07	0 10 230KHZ	0-3 v			
10/					

CIO-LAB8-TERM & CIO-LAB8-ENC



Shown with optional CIO-LAB8-ENC

Features

- · Low cost
- · No soldering required
- Interfaces to low-cost CIO-DAS-8 family

Funtional Description

The CIO-LAB8-TERM is the ideal circuit and terminal board for training and experimentation. Designed with most common interface circuitry builtin and sockets for all connections, you will find this is the easiest way to experiment with, and learn about data acquisition and control boards.

The CIO-LAB8-TERM was designed specifically for use with the Computer Interfacing Lab Manual under the direction of the authors, Dr. William H. Rigby and Terry Dalby. The Lab Manual is the only documentation available for the CIO-LAB8-TERM, so please order one with the board.

On-Board Circuits

4 momentary push-button switches

10-bit LED array

2 op-amps with trim potentiometers

Pressure transducer

AD592 temperature sensor

8 position DIP switch

2 RC filters

2 DPST electromechanical relays

2 20 kilohm potentiometers

24 easy to use screw terminals for field wiring

DAS-8 series interconnect cable: C37FF-# Optional plastic enclosure CIO-LAB-ENC

PUB-COMP-INT



Computer Interfacing

The text book we have been waiting for is here! Computer Interfacing: A Practical Approach to Data Acquisition and Control by Dr. William Rigby and Terry L. Dalby. This textbook and the accompanying lab book take you from novice to interfacing expert, covering computers, data acquisition boards, language programming and application packages.

PUB-COMP-LAB



Experiment/Lab Manual Set up a complete college level data lab, including tasks and experiments with ease. Just open the box containing your DataLab Solution, CIO-LAB8-TERM, Computer Interfacing text and the lab manual and you are ready to teach a complete course at a very low cost to your department. The 167 page Lab Manual is tailored for the Data Lab Solution with the CIO-LAB8-TERM, and chapters on: About your computer, Interfacing system, Labtech Notebook, Signal conditioning, Time of Day, Digital Input, 82C55 digital I/O, Digital Conditioning, A/D input, D/A output and

Serial I/O. Appendices cover the CIO-DAS08/Jr-AO, C and BASIC programming, the 82C55 complete reference manual and the complete schematic for the CIO-LAB8-TERM.

DAS-Wizard Data Acquisition Direct to MicroSoft Excel Worksheets

DAS-Wizard

Data acquisition direct to Microsoft Excel worksheets using any ComputerBoards or compatible DAS board for PCI, PC-Card, ISA or PC104.

Automate measurement and control using VBA. Add exciting user interface, graphing and charting integrations with the VIX-Components DAS-Wizard PRO option.

Easy to use single screen interface to I/O and Excel setup.

No data conversion required. Measurements go directly to cells as volts, temperature or A/D counts

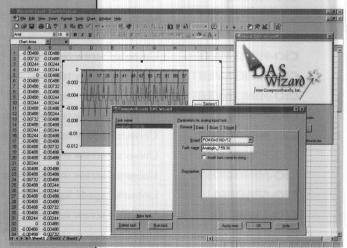
Specifications

Full speed data acquisition Datasize limited only by Excel spreadsheet size Excel 97,95 Windows 95,98,NT,2000

Applications

Analog Input/Output
Digital Sensing & Control
Temperature Logging
Laboratory Experiments
Product Test & Verification
Research & Development
Quality Control
Education

See page 16 for more about DAS-Wizard!

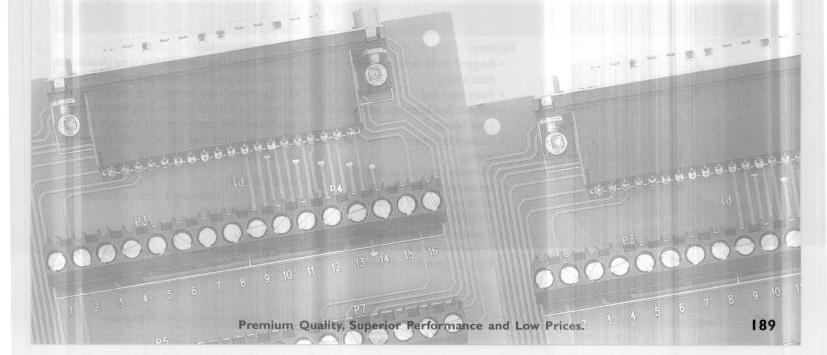


Data Acquisiton, On-Line Manual, Examples, in fact, everything you need to take measurements directly to cells in Microsoft Excel.

Screw Terminal Adapters, BNC Interconnection Boxes, Cables & Accessories

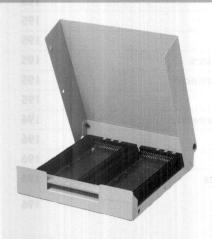


BP-37	Backplate, cable & connector to bring on-board 37-pin to back of PC (male output)	193
BP40-37	Backplate, cable & connector to bring on-board 40-pin to back of PC (male output)	193
DFCON-37	37-pin female connector, shell & crimp pins, cable termination kit	194
DMCON-25	25-pin male connector, shell & crimp pins, cable termination kit	194
BP-POWER	+5 volt PC-bus power to three standard PC power supply connectors	194
C-PCPOWER-10	10 Foot cable for connecting PC power supply internal connectors	194
C-PCPOWER-Y	Y splitter for C-PCPOWER cables	194
Cables for Data A	acquisition Interfaces	
C100FF-2	2 Foot, 100-pin female to dual 50-pin female cable	194
C100HD50 Series	100-pin high density to dual 50-pin IDC connectors	194
C100HDS Series	Shielded 100-pin high density cable	194
C25FM-2	2 Foot ribbon cable, female & male 25-pin D Connectors	195
C37FF-2	2 Foot ribbon cable, female 37-pin D connectors	195
C37FFS-10	10 Foot shielded Cable - 37-pin female D connectors	195
C37FFS-5	5 Foot shielded cable - 37-pin female D connectors	195
C37FM-2	2 Foot ribbon cable with female & male 37-pin D connectors	195
C40-37F-2	2 Foot cable, 40-pin female header to 37-pin female D connector	195
C40FF-2	2 Foot ribbon cable, female 40-pin IDC connectors	195
C50F-37F-2	2 Foot cable, 50-pin female header to 37-pin female D connector	196
C50FE-2	2 Foot, CIO-DUAL-AC5 to SSR-PB24 cable	196
C50FF-2	2 Foot ribbon cable, female 50-pin IDC connectors	196
C-EXP2DAS16-10	10 Foot DAS-16 family to EXP-series family cable/interface	196
	ationsCables, Gender Changers, and Adapters	196



terconnections that are compatible with any I/O board utilizing C37FF-x or C37FFS- series cables.

SCB-50



Features

- Rugged steal inclosure protects field wiring
- Fully shielded
- Rubber feet keep box secure on your bench
- Strain relief clamp for your field wiring
- Provides interface to two independent 50-pin compatible I/O board connectors
- Breadboard area for installation of custom circuitry
- · Easy to open hinged cover

Funtional Description

The SCB-50 screw terminal box is an ideal choice for connecting your I/O board to your field wiring. The rugged steal case provides mechanical protection as well as shielding your wiring form electronic noise. Rubber feet combined with a weight of nearly two pounds assure that the SCB-50 remains secure on your bench.

Size & Weight 6.2" x 6.8" x 1.9" (158mm x 173mm x 48mm) 30.5 ounces (.865 kg)

Compatibility:

The SCB-50 provides two independent 50-pin interconnections compatible with I/O boards utilizing C50FF-x, C100HD50-x or C100FF- series cables.

SCB-100



Features

- Rugged steal inclosure protects field wiring
- · Fully shielded
- Rubber feet keep box secure on your bench
- Strain relief clamp for your field wiring
- Provides interface to all 100 connections from boards utilizing the high density 100-pin connector
- Breadboard area for installation of custom circuitry
- Easy to open hinged cover

Funtional Description

The SCB-100 screw terminal box is an ideal choice for connecting your I/O board to your field wiring. The rugged steal case provides mechanical protection as well as shielding your wiring form electronic noise. Rubber feet combined with a weight of nearly two pounds assure that the SCB-100 remains secure on your bench.

Size & Weight 6.2" x 6.8" x 1.9" (158mm x 173mm x 48mm) 30.5 ounces (.865 kg)

Compatibility:

The SCB-100 provides connections to all I/O board utilizing C100HDS- series cables.

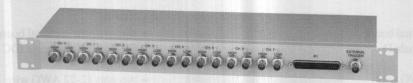
CREW TERMINAL AND BNC ROARDS AND BOYES

and 8 chan Diff (16DI) modes

inputs are supported by simply daisy chaining to one or more additional BNC-16s.

PCI-DAS1600/1200/1000 series and the CIO-DAS6400 series with C100FF-# cables

BNC-08DI



Features

- Brings analog input signals to standard BNC connectors
- Compatible with CIO-DAS8 and CIO-DAS800 series
- Supports 8 channel differential and single-ended modes

Funtional Description

The BNC-08DI allows analog input connections to a data acquistion boards through standard BNC connectors and cables.

The BNC-08DI is designed to work with a variety of 8 channel data acquisition boards and supports the 8 channels in either differential or single-ended mode.

Other Signal Connections

For user convenience, all other DAS8/800 series signals are passed throught to a 37 pin D connector that mounted on the front panel.

Form Factor 19" rack mountable or may be used as a stand alone connection box.

Compatibility:

The BNC-08DI is compatible with:

PCI-DAS08, CIO-DAS08 series and the CIO-DAS800 series with a standard C37FF-# or C37FFS-# cable

DAS-Wizard Data Acquisition Direct to MicroSoft Excel Worksheets

DAS-Wizard

Data acquisition direct to Microsoft Excel worksheets using any ComputerBoards or compatible DAS board for PCI, PC-Card, ISA or PC104.

Automate measurement and control using VBA. Add exciting user interface, graphing and charting integrations with the VIX-Components DAS-Wizard PRO option.

Easy to use single screen interface to I/O and Excel setup.

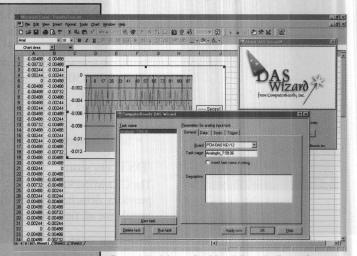
No data conversion required. Measurements go directly to cells as volts, temperature or A/D counts

Specifications

Full speed data acquisition Data size limited only by Excel spreadsheet size

Applications

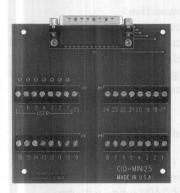
Analog Input/Output
Digital Sensing & Control
Temperature Logging
Laboratory Experiments
Product Test & Verification
Research & Development
Quality Control



See page 16 for more about DAS-Wizard!

Data Acquisiton, On-Line Manual, Examples, in fact, everything you need to take measure

CIO-MINI25 & CIO-MINI25/DST



Features

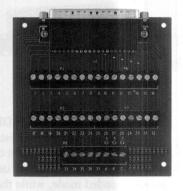
- 25 pin screw terminal board
- On-board 25-pin male D connector
- · Accepts 12-22 AWG wire
- · Low cost
- Small footprint

/DST Version

The CIO-MINI25/DST provides detachable screw terminals for all field wiring.

For Use with: CIO-DAC02, CIO-DAC02/16

CIO-MINI37 & CIO-MINI37/DST



Features

- 37 pin screw terminal board
- On-board 37-pin male D connector
- · Accepts 12-22 AWG wire
- · Low cost
- · Small footprint

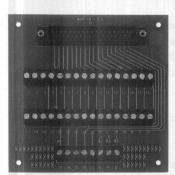
DST Version

The CIO-MINI37/DST provides detachable screw terminals for all field wiring.

For Use with:

A very wide variety of analog and digital I/O boards

CIO-MINI37-VERT & -VERT/DST



Features

- 37 pin screw terminal board
- On-board 37-pin male D connector
- · Accepts 12-22 AWG wire
- · Small footprint
- · Vertical mounting

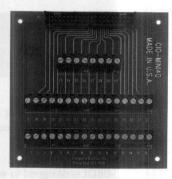
DST Version

The /DST version provides detachable screw terminals for all field wiring.

For Use with:

A very wide variety of analog and digital I/O boards

CIO-MINI40 & CIO-MINI40/DST



Features

- 40 pin screw terminal board
- On-board 40-pin male IDC connector
- · Accepts 12-22 AWG wire
- · Low cost
- Small footprint

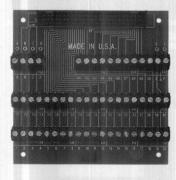
DST Version

The CIO-MINI40/DST provides detachable screw terminals for all field wiring.

For Use with:

A very wide variety of analog and digital I/O boards

CIO-MINI50 & CIO-MINI50/DST



Features

- · 50 pin screw terminal board
- On-board 50-pin male IDC connector
- · Accepts 12-22 AWG wire
- Low cost
- · Small footprint

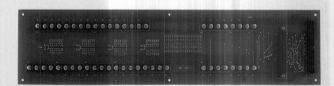
/DST Version

The CIO-MINI50/DST provides detachable screw terminals for all field wiring.

For Use with:

A very wide variety of analog and digital I/O boards

CIO-SPADE50



Features

- 50-pin spade lug board
- On-board 50-pin male IDC and 37-pin male D connectors
- Accepts industrial spade lug connectors
- · On-board prototyping area
- Low cost

For Use with:

A very wide variety of analog and digital I/O boards

SCREW TERMINAL AND BNC BOARDS AND BOXES

CIO-TERM100 & -TERM100/DST

/DST Version pro

Features

- 100 pin screw terminal board
- On-board daisy-chained 50-pin male IDC connectors
- Accepts 12-22 AWG wire
- Positions for pull-up resistors on-board

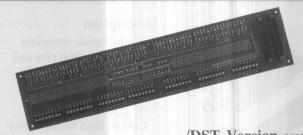
/DST Version provides detachable screw terminals for all field wiring.

For Use with:

-DI192 and -DI96

High density digital I/O boards such as the PCI-DAS16xx, PCI-DAS12xx, CIO-DIO192, -DIO96, -DO192H, -DO96H,

CIO-TERMINAL & /DST



Features

- 37 pin screw terminal board
- On-board daisy-chained 37-pin male D connectors
- · Accepts 12-22 AWG wire
- · Low cost
- On-board prototyping area

/DST Version provides detachable screw terminals for all field wiring.

For Use with:

Any I/O board with 37-pin D connectors. This represents a very wide variety of analog and digital I/O boards.

CABLES AND CONNECTORS

BP-37



Description

Brings 37-pin on-board aux connectors out to 37-pin male connector on computer back plate.

For Use with:

CIO-DAS8, CIO-DAS16, CIO-DAS16F plus a variety of other boards

BP40-37



Description

Brings 40-pin on-board aux connectors out to 37-pin male connector on computer back plate.

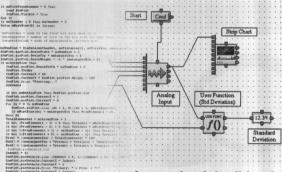
For Use with:

CIO-DAS16/M1 & M1/16 CIO-DAS16/M1, CIO-DAS1600 family CIO-DAS08/AO plus a variety of other boards

SoftWIRETM

Graphical Programming for Visual Basic

The power and flexibility of syntactical programming



The speed and simplicity of graphical programming

Introducing SoftWIRE™

Graphical Programming in Visual Basic®

Syntactical programming has been around since the early days of computers. More recently, graphical programming languages have been introduced and are now a popular alternative to writing hard core, text-based syntax. What's been lacking is an easy way to combine the speed and ease of use of graphical programming with the flexibility and efficiency of writing code in an industry standard language. Until now—Introducing SoftWIRE.

For more information on SoftWIRE, please see pages 6-10 in this catalog.

DFCON-37



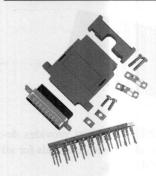
Description

37-pin female connector with shell, crimp pins and cable termination kit

For Use with:

Custom field wiring to any board using a 37-pin male output connector

DMCON-25



Description

25-pin male connector with shell, crimp pins and cable termination kit

For Use with:

Custom field wiring to CIO-DAC02 series or any board using a 25-pin female output connector

BP-POWER



Description

Brings computer +5V/+12 power to three standard PC Power connectors

C-PCPOWER-10



Description

10 foot cable for connecting PC power supply to internal connections

C-PCPOWER-Y



Description

Y splitter for other PCPOWER cables

C100FF-2



Description

100 conductor cable, 2 feet long. One 100-pin female connectors to two 50-pin female. Available in 1, 2, 3, 4, 5, 10, 15, 20, 25, and 50 foot lengths. Order the C100FF-# where # is the length.

For Use with:

PCI-DAS series, PCI-DDA0x/12 series, PCI-DIO96 and DIO48/CTR15, plus the CIO-DAS6400 series

C100HD50-3



Description

100 conductor high density cable, 3 feet long.

For Use with:

PCI-DAS64/Mx/16 series and PCI-DDA0x/16 series

C100HD50-6



Description

100 conductor high density cable, 6 feet long.

For Use with:

PCI-DAS64/Mx/16 series and PCI-DDA0x/16 series

C100HDS-3



Description

100 conductor shielded, high density cable, 3 feet long.

For Use with:

PCI-DAS64/Mx/16 series and PCI-DDA0x/16 series

CABLES AND CONNECTORS

C100HDS-6



Description

100 conductor shielded, high density cable, 6 feet long.

For Use with:

PCI-DAS64/Mx/16 series and PCI-DDA0x/16 series

C25FM-2



Description

25 conductor cable, 2 feet long. One Male and one female connector. Also available in 1, 2, 3, 4, 5, 10, 15, 20, 25, and 50 foot lengths. For these lengths, order the C25FM-# where # is the desired cable length in feet.

For Use with:

CIO-DAC02 plus a variety of other boards

C37FF-2



Description

2 foot long, 37-pin cable with female D type connectors on each end. Also available in 1, 2, 3, 4, 5, 10, 15, 20, 25, and 50 foot lengths. For these lengths, order the C37FF-# where # is the desired cable length in feet.

For Use with:

CIO-DAS1600 series, CIO-DAS08 series, CIO-DDA06 series, CIO-DIO series plus a variety of other boards

C37FFS-10



Description

10 foot long, 37 conductor shielded cable. 37-pin female D connectors on each end.

For Use with:

CIO-DAS1600 series, CIO-DAS08 series, CIO-DDA06 series, CIO-DIO series plus a variety of other boards

C37FFS-5



Description

5 foot long, 37 conductor shielded cable. 37-pin female D connectors on each end.

For Use with:

CIO-DAS1600 series, CIO-DAS08 series, CIO-DDA06 series, CIO-DIO series plus a variety of other boards

C37FM-2



Description

2 foot long, 37-pin cable with one male, one female D connector. Suitable as cable extension for all 37-pin interconnections. Available in 1, 2, 3, 4, 5, 10, 15, 20, 25, and 50 foot lengths. For these lengths, order the C37FM-# where # is the desired cable length

For Use with:

A wide variety of boards

C40-37F-2



Description

2 foot long, 40-pin female header to female 37-pin D connector. Also available in 1, 2, 3, 4, 5, 10, 15, 20, 25, and 50 foot lengths. For these lengths, order the C40F-37F-# where # is the desired cable length in feet.

For Use with:

A wide variety of ISA and PC104 based boards

C40FF-2



Description

2 foot long, 40-pin cable with female header type connectors on each end. Also available in 1, 2, 3, 4, 5, 10, 15, 20, 25, and 50 foot lengths. For these lengths, order the C40FF-# where # is the desired cable length in feet.

For Use with:

Various PC104 series boards

CABLES AND CONNECTORS

C50F-37F-2



Description

2 foot cable connects 50-pin header female connector to 37-pin 'D' female connector. Also available in 1, 2, 3, 4, 5, 10, 15, 20, 25, and 50 foot lengths. For these lengths, order the C50F-37F-# where # is the desired cable length in feet.

For Use with: Converts PDISO16 to a PDISO8 compatible D connector

C50FE-2



Description

2 foot long cable connects the CIO-DUAL-AC5 digital I/O board to the SSR-PB24 I/O module rack. Also available in 1, 2, 3, 4, 5, 10, 15, 20, 25, and 50 foot lengths. For these lengths, order the C50FE-# where # is the desired cable length in feet.

For Use with: CIO-DUAL-AC5 and SSR-PB24

C50FF-2



Description

50 conductor cable, 2 feet long. Female connectors on both ends. Also a feet.

For Use with: CIO-DAS48 series, CIO-DIO, -DI, -DO series plus a variety of other boards

CEXP2DAS16-10



Description

Special cable allows the DAS-16 family to use the EXP-16/32 series expansion multiplexor boards. Cable is 10 feet long.

For Use with: CIO-DAS16 series boards & CIO-EXP-series boards

Serial Communications Cables, Gender Changers and Adaptors



Serial I/O Cables

C25F9M-10 Cable, 25-pin F, to 9-pin M cable, 10 ft Cable, 25-pin F, to 9-pin M cable, 25 ft C25F9M-25 C25F9M-50 Cable, 25-pin F, to 9-pin M cable, 50 ft Cable, 9-pin M, to 9-pin F cable, 10 ft C9FM-10 C9FM-25 Cable, 9-pin M, to 9-pin F cable, 25 ft C9FM-50 Cable, 9-pin M, to 9-pin F cable, 50 ft

C9FF-10 Cable, 9-pin F, to 9-pin F cable, 10 ft C9MM-10 Cable, 9-pin M, to 9-pin M cable, 10 ft C25FM-10 Cable, 25-pin M, to 25-pin F cable, 10 ft C25FF-10 Cable, 25-pin F, to 25-pin F cable, 10 ft C25MM-10 Cable, 25-pin M, to 25-pin M cable, 10 ft

Serial I/O Adaptors and Gender Changers

SADP-9MM Adaptor, 9-pin M, to 9-pin M SADP-9FF Adaptor, 9-pin F, to 9-pin F SADP-25MM Adaptor, 25-pin M, to 25-pin M Adaptor, 25-pin F, to 25-pin F

Serial I/O Adaptors and Gender Changers

SADP-25F9M Adaptor, 25 pin F, to 9-pin M Adaptor, 25-pin M to 9-pin F SADP-25M9F SADP-25FM-NM Adaptor, 25-pin M, to 25-pin F, null modem

SADP-9FM-NM Adaptor, 9-pin M, to 9-pin M, null modem

SADP-25FF

Enclosures, Racks, Chassis and **DIN Rail Mounting Hardware**



ENC-MINI50	Plastic Enclosure for MINI 50. Cut out for 50-pin connector	199
ENC-19X7X3	Enclosure for CIO-SSR, ERB, TERM I 00, -SPADE 50 and -TERMINAL boards	199
ENC-19X5X5	Rack mount enclosure (5.25" high, 5" deep)	199
ENC-19X5X7	Rack mount enclosure (7.00" high, 5" deep)	199
19" Racks		
ERTT-14	Enclosed 19" Table top rack, 14" vertical rack space	199
ERTT-23	Enclosed 19" table top rack, 22.75" vertical rack space	199
RR-1249	31" (28" vertical panel space) table top rack mount	199
RR-1364	76" (71.75" vertical panel space) floor mounted rack mount	199
Blank Face Panels	3.5" and 5.5 " blank face panel for 19" racks, (available in Black and Gray)	199
NEMA Enclosures		
NEMA-2R16126	NEMA12, 16x12x6 enclosure and accessories	200
NEMA-2R20206	NEMA12, 20x20x6 enclosure and accessories	200
NEMA-2P16126	NEMA4, 16x12x6 enclosure and accessories	200
NEMA-2P20206	NEMA4, 20x20x6 enclosure and accessories	200
CIE-Series High-De	ensity, Industrial Mounting Chassis	200

NEW!

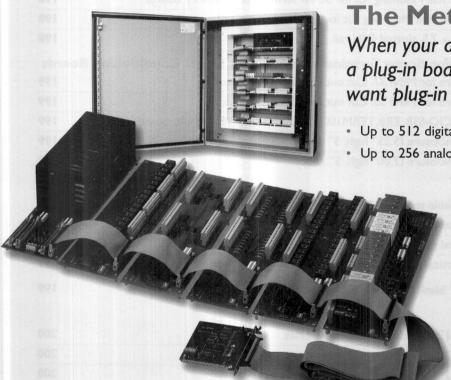
Steel DIN Rail (TS35 x 7.5 standard)

Decel Dal (Ass	an (1500 h / 10 Standard)
DIN-RAIL-10	10" standard T35 x 7.5, slotted DIN rail
DIN-RAIL-17	17" standard T35 x 7.5, slotted DIN rail
DIN-RAIL-18	18" standard T35 x 7.5, slotted DIN rail
DIN-RAIL-39	39" standard T35 x 7.5, slotted DIN rail

DIN-16X4.8 for: MetraBus I/O Boards,

Other Sizes:

Please call/email us if the board you wish to mount is not listed above. New DIN kits are in process and may be available for your boards.



The MetraBus family

When your application is too big for a plug-in board solution, but you still want plug-in board prices!

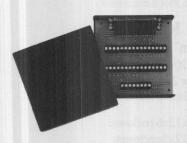
- Up to 512 digital I/O bits per PC slot
- Up to 256 analog I/O channels per PC slot
 - · Very low cost per point
 - · Wide variety of I/O boards & functions
 - ISA, PCI, cPCI and PC/104 compatible
 - Wide selection of packaging and mounting options
 - · Universal Library software support
 - Windows 95, 98, NT & 2000 support

See Pages 219-236

Enclosures, Racks, Chassis and DIN Rail Mounting Hardware

ENC-MINI37

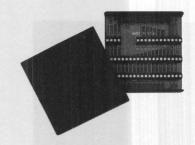
ENC-MINI50



Features

- · High impact plastic
- Cut-out for 37 and 25 pin connectors
- Low cost
- Small footprint

For Use with: CIO-MINI37 & CIO-MINI25

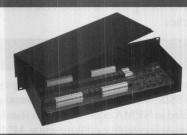


Features

- High impact plastic
- Cut-out for 50 pin or 40 pin connectors
- · Low cost
- · Small footprint

For Use with: CIO-MINI40 & CIO-MIN50

ENC-19X7X3



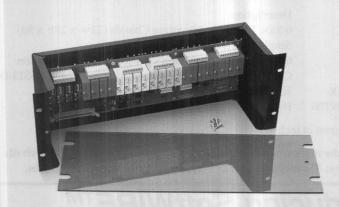
Features

- · Low cost / great value
- 19 inch rack mountable
- Allows high-density horizontal mounting configuration

Description

The ENC-19X7X3 fits in a standard 19" rack and takes up only 3.5" of vertical front panel space. This allows high-density, horizontal mounting of the following boards: CIO-TERMINAL, -TERM100, SPADE50 plus the CIO-ERB series, SSR-series, the CIO-EXP series and the MetraBus.

ENC-19X5X5 & ENC-19X5X7



ENC-19X5X5

ENC-19X5X5 version is compatible with 4" wide boards including: CIO-MINI series, CIO-ERB08, CIO-SERB08, CIO-EXP16, ISO-DA08, ISO-RACK08, SSR-RACK08, CIO-EXP32, CIO-EXPGP, , ISO-RACK16, ISO-DA16/8/4/2, CIO-TERM100, CIO-SPADE50, CIO-SSH16 and all MetraBus I/O boards.

ENC-19X5X7

ENC-19X5X7 version compatible with 4.5" and 4.8" wide boards including: CIO- ERB24/48, CIO-SERB24/48, SSR-RACK24/48 and the CIO-EXP-RTD16 and CIO-EXP-BRIDGE16

19 Inch Racks



Enclosed Table Top Racks

ERTT-14 19" Table top rack, 14" rack space, suitable for two 5.25" enclosures ERTT-23 19" table top rack, 22.75" rack space, suitable for three 5.25" enclosures

Free Standing Racks (not shown)

RR-1249 31" (28" panel space) table top rack mount

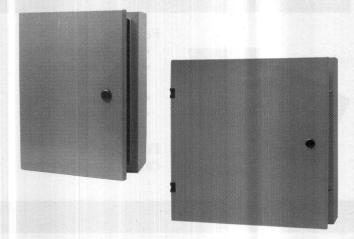
RR-1364 76" (71.75" panel space) floor mounted rack mount

RC-7758 Wheels for RR-1364MG

Blank 19" Rack Faceplates

BLK-35G 3.5" blank rack panel, Gray BLK-55G 5.5" blank rack panel, Gray BLK-35B 3.5" blank rack panel, Black BLK-55B 5.5" blank rack panel, Black

NEMA Enclosures



For use with the CIE-CHASSIS-06

Part Number Description*

CIE-NEMA4X NEMA4, 30 x 36 x 8 enclosure

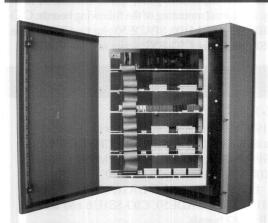
For use with DIN Rail Kits

Part Number	Description*
NEMA-2P20206	NEMA4, 20x20x6 enclosure
NEMA-18P1717	Inner panel for 20x20x6 enclosure
NEMA-2DMK20	Din rail installation kit for 20x20 enclosures
NEMA-2R16126	NEMA12, 16x12x6 enclosure
NEMA-2P16126	NEMA4, 16x12x6 enclosure
NEMA-18P1309	Inner panel for 16x12x6 enclosure
NEMA-2DMK16	Din rail installation kit for 16x12 enclosures)

External mounting feet for NEMA enclosures all dimensions shown in inches

NEMA-2ZPMF

ComputerBoards Industrial Enclosure (CIE) Chassis



The CIE-CHASSIS-06 shown mounted in the (optional) **CIE-NEMA4X** enclosure

The CIE-CHASSIS-06 mounting chassis provides a compact, rugged mounting system for up to 64.8 inch wide I/O boards. The CIE-CHASSIS-06 may be mounted free standing, attached to a wall or any flat surface, may be installed in NEMA enclosures or in standard 24 inch racks. A louvered top plate assures maximum convective cooling while AC Fan cooling is available as an option. The top and bottom plates may be removed, allowing CIE-CHASSIS-06 units to be stacked without affecting cooling air flow.

Part Number Description

CIE-CHASSIS-06 6 Slot, MetraBus Mounting Chassis (21w x 28h x 5d)*

CIE-FAN-01 Single slot fan kit

CIE-FAN-06 6 Slot (one per board) fan kit. Free factory installation CIE-CGUIDE-15 Cable guides (15). One kit included with CIE-CHASSIS-06

CIE-EIA-MOUNT06 Hinged mounting kit for 24 inch rack installations CIE-NEMA-MOUNT06 Hinged mounting kit for CIE-NEMA4X enclosure

*all dimensions shown in inches

For further information on the CIE-CHASSIS series, please visit our web site and click on Mounting Racks & Accesories in the MetraBus section.

Graphical Programming for Visual Basic The power and flexibility of syntactical programming The speed and simplicity of graphical programming

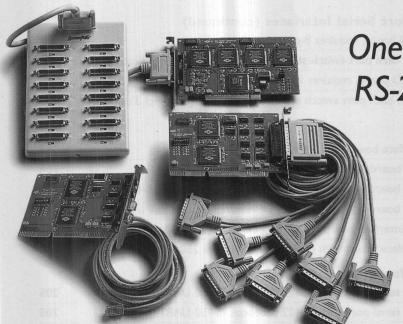
Introducing SoftWIRE™

Graphical Programming in Visual Basic®

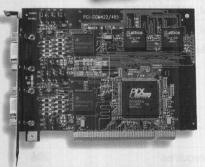
Syntactical programming has been around since the early days of computers. More recently, graphical programming languages have been introduced and are now a popular alternative to writing hard core, textbased syntax. What's been lacking is an easy way to combine the speed and ease of use of graphical programming with the flexibility and efficiency of writing code in an industry standard language. Until now— Introducing SoftWIRE.

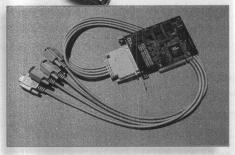
> For more information on SoftWIRE, please see pages 6 -10 in this catalog.

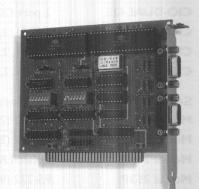
Serial Communications Interfaces



One to sixteen port
RS-232, RS-422 and
RS-485 serial
interfaces for
PCI and ISA







bus computers.

PCI Bus Intell	igent Multi-Port Serial Interfaces	Page
95860-4	4-port PCI-bus RS-232 board including quad DB25M cables/connectors	203
95880-2	4-port PCI-bus RS-232 board including quad DB9M cables/connectors	203
95850-5	8-port PCI-bus RS-232 board including octal DB25M cables/connectors	203
95870-3	8-port PCI-bus RS-232 board including octal DB9M cables/connectors	203
95890-1	8-port PCI-bus RS-232 board including octal RJ45 cables/connectors	203
95760-7	8-port PCI-bus serial I/O board, requires 8-port distribution box.	203
95050-9	8-port distribution box, each port switch selectable as RS-232/422 (incl 3'cable)	203
95750-8	16-port PCI-bus serial I/O board, requires 16-port distribution box.	203
95100-1	16-port distribution box, each port switch selectable as RS-232/422 (incl 3'cable)	203
ISA-Bus High-	Speed, Intelligent Multi-Port Serial Interfaces	
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Serial Communications Interfaces

ROCKETPORT® 4, 8 & 16 port ISA & PCI serial I/O boards



* requires 9008411-03 (3 foot) or 9008411-06 (6 foot) RJ45 cable

DESCRIPTION

Features

- 4, 8 or 16 serial ports per board
- · PCI and ISA versions available
- Up to 230.4 Kbaud transmit and receive rates
- Windows 3.x, Windows 95 and Windows NT drivers
- RS-232 with full modem control signals
- Per port switchable RS-232/422 with external distribution panel models
- FIFO buffer 64 times the 16550 UART FIFO
- DB25M, DB9M and RJ11/45 connections
- Built-in 10 KV surge protection
- I/O mapping eliminates memory conflicts and allows plug-and-play compatibility

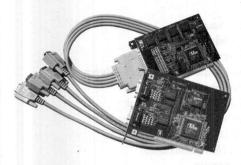
All boards include drivers for Windows 3.x, Windows 95, 98 and Windows NT!

Part#

ROCKETPORT® PCI-based multiport serial boards

	05060 4
4-port PCI-bus RS-232 board including quad DB25M cables/connectors	95860-4
4-port PCI-bus RS-232 board including quad DB9M cables/connectors	95880-2
8-port PCI-bus RS-232 board including octal DB25M cables/connectors	95850-5
8-port PCI-bus RS-232 board including octal DB9M cables/connectors	95870-3
8-port PCI-bus RS-232 board including octal RJ45* cables/connectors	95890-1
* requires 9008411-03 (3 foot) or 9008411-06 (6 foot) RJ45 cable	
8-port PCI-bus serial I/O board, requires 8-port distribution box.	95760-7
8-port distribution box, each port switch selectable as RS-232/422 (incl 3'cable)	95050-9
16-port PCI-bus serial I/O board, requires 16-port distribution box.	95750-8
16-port distribution box, each port switch selectable as RS-232/422 (incl 3'cable)	95100-1
ROCKETPORT® ISA-based multiport serial boards	
DESCRIPTION	Part#
4-port ISA-bus RS-232 board including quad DB25M cables/connectors	95510-8
4-port ISA-bus RS-232 board including quad DB9M cables/connectors	95530-6
4-port ISA-bus RS-232 board including quad RJ45* cables/connectors	94150-7
8-port ISA-bus RS-232 board including octal DB25M cables/connectors	95500-9
8-port ISA-bus RS-232 board including octal DB9M cables/connectors	95520-7
8-port ISA-bus RS-232 board including octal RJ45* cables/connectors	95540-5
8-port ISA-bus serial I/O board, requires 8-port distribution box.	94800-1
8-port distribution box, each port switch selectable as RS-232/422 (incl 3'cable)	95050-9
16-port ISA-bus serial I/O board, requires 16-port distribution box.	94810-0
16-port distribution box, each port switch selectable as RS-232/422 (incl 3'cable)	95100-1

PCI-COM232 Series



Features

- 1, 2 and 4-port versions available
- Independent UART per port
- 16C550 UART with 16-byte FIFO
- · Data transfer rates to 460.8 kbaud
- · All ports on multi-port versions share a single interrupt
- · Optional surge suppression and protection on COM port available
- Windows 95, 98, NT & 2000 support
- · Fully plug-and-play, no jumpers or switches to set

Functional Description

The PCI-COM232 family consists of one, two and four port, RS-232 compatible, serial I/O boards designed to operate in computers with PCI bus accessory slots. The boards include complete software drivers for Windows 95, 98, 2000 and NT that allow the boards to be installed as standard "COM" ports in your computer.

The boards are fully plug-and-play and provide an independent UART for each port. The boards provide data and all standard RS-232 handshaking signals and operate up to a maximum baud rate of 460.8 kbaud. All connections in the one and two port boards are made through standard DB9M connectors. Four port boards provide a 37-pin connector that is then brought out via cable to four DB9M or DB25M connectors (cable included with board).

Specifications

Communications Specifications

UART Type 16C550 with 16 byte FIFO

Baud Rate

Standard Mode 300 baud to 115.2 Kbaud 1200 baud to 460.8 Kbaud Extended Mode

Power consumption

PCI-COM232 +5V: 220 mA typical PCI-COM232/2 +5V: 225 mA typical +5V: 230 mA typical PCI-COM232/4

Environmental

0 to 70°C Operating temp Storage temp -40 to 100°C Humidity 0 to 90% non-condensing

Ordering Information

PCI-COM232 PCI-COM232/2 PCI-COM232/4-9 Single port RS-232 interface Dual port RS-232 interface Four port RS-232 interface

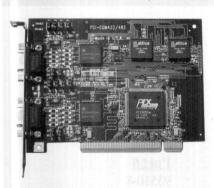
with DB9 connectors

PCI-COM232/4-25

Four port RS-232 interface with DB25 connectors

Add optional surge protection with a /S suffix (e.g. PCI-COM232/2/S)

PCI-COM422/485 Series



Features

- Single or Dual RS-422 or RS-485 ports
- RTS & CTS Control lines supported
- · Independent UART for each channel
- · RS-485 transmitter controlled by software, RTS or auto-detect
- · 16C550 UART with 16-byte FIFO
- · Data transfer rates up to 460.8 kbaud
- · Both ports share a single interrupt
- Windows 95, 98, NT & 2000 support
- · Fully plug-and-play, no jumpers or switches to set

Specifications

Communications Specifications

UART Type 16C550 with 16 byte FIFO **Baud Rate** Standard Mode 300 baud to 115.2 Kbaud

Extended Mode 1200 baud to 460.8 Kbaud

Power consumption

PCI-COM422/485 +5V: 250 mA typical PCI-COM422/485/2 +5V: 265 mA typical

Environmental

0 to 70°C Operating temp Storage temp -40 to 100°C Humidity 0 to 90% non-condensing

DB9 Connector Pin-out

Gnd RX+ RTS+ RX-RTS-8 TX+ CTS+ TX-CTS-

Ordering Information

PCI-COM422/485 Single port RS-232 interface PCI-COM422/485/2 Dual port RS-232 interface Add optional surge protection with a /S suffix (e.g. PCI-COM232/2/S)

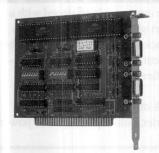
Functional Description

The PCI-COM422/485 family consists of one and two port, RS-422/485 compatible, serial I/O boards designed to operate in computers with PCI bus accessory slots. The boards include complete software drivers for Windows 95, 98, 2000 and NT that allow the boards to be installed as standard "COM" ports in your computer. RS-422 or RS-485 operation is software selectable.

The boards are fully plug-and-play and provide an independent UART for each port. The boards provide data and as well as RTS/CTS handshaking signals and operate up to a maximum baud rate of 460.8 kbaud. All connections are made through standard DB9M connectors.

Serial Communications Interfaces

CIO-DUAL422/550 & CIO-DUAL422



Features

- Dual port, RS-422 serial interface board
- COM1, 2, 3 or 4
- 16450 UART (std model)
- 16550 UART (/550 model)

Specifications Serial ports Configured as

2, independent COM1, COM2, COM3

or COM4 56 kbaud

Max. baud rate Serial modes

5, 6, 7, or 8 data bits odd, even or no parity

0, 1 or 2 stop bits

RTS/CTS protocol
UART

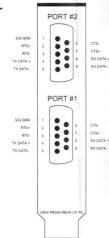
jumper enabled/disabled 16450 (CIO-DUAL422) 16550 (CIO-DUAL422/550)

(the 16550 adds a 16-byte FIFO data buffer which increases maximum serial transfer rates)

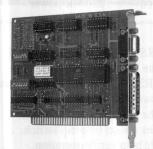
Cable length

Up to 1.2 kilometer

Connector Diagram



CIO-COM422/550 & CIO-COM422



Features

- RS-232, RS-422 and current loop serial interface board
- · COM1, 2, 3 or 4
- 16450 UART (std model)
- 16550 UART (/550 model)

Specifications Serial ports

Configured as

Max. baud rate Serial modes

RTS/CTS protocol

UART

1 COM1, COM2, COM3 or COM4

> 56 kbaud 5, 6, 7, or 8 data bits odd, even or no parity

0, 1 or 2 stop bits switch enabled/disabled 16450 (CIO-COM422)

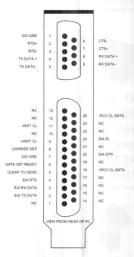
16550 (CIO-COM422/550)

(the 16550 adds a 16-byte FIFO data buffer which increases maximum serial transfer rates)

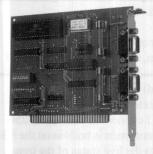
Cable length

Up to 1.2 kilometer

Connector Diagram



CIO-COM485



Features

- · RS-485 serial interface
- · Com1, 2, 3 or 4
- 16550 UART
- Up to 32 nodes on bus

Specifications
Serial ports
Configured as

Max. baud rate Serial modes

Output control

UART Cable length Network nodes 1

56 kbaud

COM1, COM2, COM3 or COM4

5, 6, 7, or 8 data bits odd, even or no parity

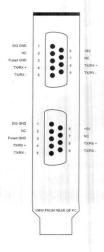
0, 1 or 2 stop bits Software selectable

transmitter enabling allows networked operation

16550 Up to 1.2 kilometer

Up to 32

Connector Diagram





Features

- · Full duplex signals
- DTE/DCE switch
- · TD and RD indicators
- DC to 115.2 kbps

Model 63-2SA-RS-232 to RS422 Converter

The Model 63-2SA provides a hardware conversion for full duplex signals between RS-232 and RS-422 I/O ports. Since the RS-232 port may look like a computer or a modem, the converter is equipped with a DTE/DCE selector switch. The Model 63-2S will couple any RS-232C port with any RS-422 device, or two RS-232 devices over a greater distance when using two 63-2SA's back to back as line drivers. The 63-2SA contains TD and RD LED's to allow rapid verification of equipment performance. A programmable cable terminator provides the flexibility of mating with various cables.

Model 63-2SA RS-232 (25M) to RS-422 (screw terminals) converter, Full-duplex, 110 Vac power Model 63-2SA-220 RS-232 (25M) to RS-422 (screw terminals) converter, Full-duplex, 220 Vac power



Features

- · Active/passive loops
- 20 or 60 mA operation
- DC to 19.2 kbps
- · Half/full duplex
- · Optically isolated

Model 65A - RS-232 to Current Loop Converter

The Model 65A is a small, versatile, RS-232 to Current Loop Converter for use with 20 mA or 60 mA current loops. The Model 65 includes a wall mounted transformer and internal power supply circuitry. The Model 65A provides switch selection of all operating modes including: Half Duplex - Passive Loop, Half Duplex - Active Loop, Full Duplex - Passive Loop or Full Duplex - Active Loop. An I/O selection switch is included to allow accommodating both DTE and DCE devices. The units will drive 20 mA. and accept 20 mA or 60 mA loop currents and operates from dc to 9.6 kbps.

Model 65A RS-232 (25M) to Current loop (screw terminals) converter, 110 Vac power Model 65A-220 RS-232 (25M) to Current loop (screw terminals) converter, 220 Vac power



Features

- Over 500 volts isolation
- Selectable RS-422 or -485
- Selectable 2/4 wire RS-485
- Intelligent RS-485 control
- TD&RDLED's
- · Data Rates up to 128 kbps

Model 245 - Isolated RS-232 to RS-422/RS-485 Converter

The Model 245 provides an isolated RS-232 to RS-422 or RS-485 link. In RS-422 mode, it converts full duplex data, TD and RD. In RS-485 systems, it "intelligently" controls the RS-485 lines either by the use of RTS, or enables the RS-485 output when TD data is applied to the RS-232 port. In the 2 wire mode when no data is received by the RS-232 receiver, the RS-485 receiver is switched ON. When data is detected for transmission, the transmitter is enabled. In the 4 wire mode the RS-485 receiver is constantly ON while the transmitter is switched as required. Operating modes are set by a dip switch. A DTE/DCE switch reverses RS-232 pins 2 and 3. Status LED's on each side help verify operation.

Model 245 Isolated RS-232 (25M) to 422/485 (25F) converter, 115 Vac power Model 245-220 Isolated RS-232 (25M) to 422/485 (25F) converter, 220 VAC power



Features

- DB9 data port
- Data rates to 19.2 kbps
- No power required
- Full duplex
- · Surge protected

Model 253 - RS-232 to RS-422 Converter (no external power required)

The Model 253 Converter allows a standard personal computer serial port to now interface directly with RS-422 devices. The Model 253 supports full duplex signals at data rates up to 19.2 kbps, without requiring any ac or dc power. With only TD, RD and ground, the Model 253 provides operation over 8,000 feet of twisted pair cable into a load of 120 ohms. The Model 253 features a female DB9 connector, thus allowing it to be plugged directly into any one of most PC's Comm ports. When using the Model 253 in this mode, the DTE/DCE switch is positioned to the DCE position.

Model 253P RS-232 (9F) to RS-422 (RJ11) converter, no external power required RS-232 (9F) to RS-422 (screw terminal) converter, no external power required



Features

- Helpful LCD display
- Data rates to 19.2 kbps
- Screw terminals and RJ-11
- External DTE/DCE switch
- Built-in surge protection
- · No power required

Model 256 - RS-232 to RS-422 Converter (no external power required)

The Model 256 provides RS-232 to RS-422 conversion and requires no external power supply. Differential RS-422 signals are provided on screw terminals and an RJ-11 connector. The Model 256 will drive 8,000 feet of twisted pair wire into a load of 120 ohms. Surge protection is built-in on the RS-422 port. The Model 256 includes a helpful LCD display, which presents the live status of the transmit/receive data signals, and control signals, CTS, RTS, DSR, DCD and DTR. The unit requires only TD, RD, and ground for operation, but supports all control signals if desired. The Model 256 offers full duplex operation up to 19.2 kbps. The DTE/DCE switch allows reversal of RS-232 pins 2 and 3.

Model 256M RS-232 (25M) to RS-422 (ST/RJ11), with LCD, no power required, surge protected RS-232 (25F) to RS-422 (ST/RJ11), with LCD, no power required, surge protected.

Serial Communications Interfaces



Features

- · 1500 Vac isolation
- Eliminates noise problems
- · Eliminates ground loops
- 0-19.2 kbps
- · Requires no ext power

Model 268 - RS-232 Isolation Module

The Model 268 Module provides an isolated communications link between RS-232 systems. The Model 268 protects against ground loops between the system controller and monitoring devices. The 268 ensures no ground and other noise problems while providing full duplex, optically isolated signal paths for data, TD and RD, and a control signal pair selected by internal jumpers (CTS, RTS, DCD, or DTR). In addition to opto isolation, the Model 268 incorporates micro power DC to DC converters that generate the necessary operating voltages. There are two sets of these circuits, one for each port. The Model 268 will operate even if only TD and RD are connected. The aluminum case is not connected to either port.

Model 268 RS-232 isolation module (25M to 25F), data signals only, no power required



Features.

- · Full Data & Handshake
- RS-422Bi-Directional
- 500 Vac Isolation
- · Dc to 19.2 kbps
- · Requires no ext power

Model 281 - RS-422 Isolation Module

The Model 281 provides two full duplex, optically isolated signal paths for data (TD and RD), and a control signal pair that supports RTS/CTS or DTR/DCD (selected via internal jumpers). Isolation is important when components of a system use different power sources, have noisy signals, or must operate at different ground potentials. Power is derived from the signals applied to the ports so the Model 281 requires no external power. The Model 281 requires only TD, RD and Ground are connected though it will support control signals if desired.. The DCE port is implemented with a DB25 male connector while the DTE port uses a DB25 female connector. The aluminum case is not connected to either port

Model 281 RS-422 isolation module (25M to 25F), all signals, no power required.



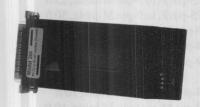
Features

- Selectable RS-422485
- Selectable 2/4 wire
- · Helpful LCD display
- Intelligent control
- DTE/DCE compatible
- · Data rates to 115.2 kbps

Model 365 - RS-422/RS-485 to RS-232 Converter

The Model 365 provides a link between RS-485 or RS-422 equipment, and RS-232. As an RS-232 to RS-422 interface converter, the Model 365 operates in full duplex mode using both TD and RD. As an RS-232 to RS-485 converter, the Model 365 can be configured as a 2 wire or 4 wire converter providing an "intelligent" RS-485 conversion. In half duplex mode, data flow can be controlled either via the use of RTS, pin 4, of the RS-232 port, or the port can be activated when TD data is applied to the RS-232 port. The Model 365 includes an LCD display providing status information. The LCD is extremely helpful during installation and checkout or whenever problems are suspected. The display presents the live status of the TD/RD data signals, and control signals, CTS, RTS, DSR, DCD and DTR.

Model 365 RS-232 (25M) to RS-422/485 (screw term) converter, LCD display, 110 VAC Model 365-220 RS-232 (25M) to RS-422/485 (screw term) converter, LCD display, 220 VAC



Features

- DataSpy® status display
- Supports 32 users
- Uses single twisted pair
- External DTE/DCE switch
- · Selectable termination

Model 366 - RS-232 to RS-485 Converter

The Model 366 interfaces RS-232 equipment with RS-485. Transmission and reception modes are set with dip switches and use the RS-232 RTS (Request to Send) and CTS (Clear to Send) signals. The Model 366 offers three choices of data flow control. In the Model 366 the RTS (Pin 4) and CTS (Pin 5) signals of the RS-232 connector are jumpered together. This combined signal controls the transmitter and may also control the receiver. There are four line terminating resistors, dip switch selectable to match the twisted pair being used. The Model 366 includes an LCD display, which provides important status information. The LCD is extremely helpful during installation and checkout or whenever problems are suspected. The graphic display presents the user with live status of the transmit and receive data signals, TD and RD, and control signals, CTS, RTS, DSR, DCD and DTR.

Model 366M RS-232 (25M) to RS-485 (screw terminals) converter, 110 VAC powered RS-232 (25M) to RS-485 (screw terminals) converter, 220 VAC powered Model 366F RS-232 (25F) to RS-485 (screw terminals) converter, 110 VAC powered RS-232 (25F) to RS-485 (screw terminals) converter, 220 VAC powered RS-232 (25F) to RS-485 (screw terminals) converter, 220 VAC powered



Features

- Full duplex to 56 kbps
- 2 kilometers on 62/125 fiber
- · Total electrical isolation
- · Standard ST fiber connectors
- · No power required

Model 271 - Auto Powered RS-232 to Fiber Optic Converter

The Model 271 translates RS-232 signals to fiber optic at full duplex data rates to 56 KBPS. The Model 271 provides full duplex, asynchronous communications over two fibers, and is completely powered by the RS-232 port transmit signal. The Model 271's 12-dB power budget provides communications up to 2 kilometers, with data rates as high as 56 KBPS over standard 62/125 fiber cables (see the CFO cable series below). The Model 271 is equipped with a DTE/DCE switch that reverses pins 2 and 3 of the RS-232 connector. The RS-232 port can be implemented as a male or female DB25 connector. The fiber cable port connectors are industry standard ST types.

Model 271M/ST Model 271F/ST RS-232 (25M) to Fiber optic converter, no power required, ST fiber connectors RS-232 (25F) to Fiber optic converter, no power required, ST fiber connectors



Features

- · Data rate to 1 Mbps
- · Programmable data control
- RS-485 via standard DB25F connector
- · Standard ST fiber connectors

Model 276 - RS-485 to Fiber Optic Line Driver

The Model 276 translates RS-485 signals to fiber optic at full duplex data rates to 1.0 Mbps. The RS-485 interface is a standard, balanced, half duplex configuration provided at a female DB25 connector. The fiber optic ports use industry standard ST connectors and 62.5/125 micron fiber cable (see the CFO cable series below). The fiber receiver automatically detects an incoming signal and enables the RS-485 transmitter. With an optical wavelength of approx. 830 nm and a power budget of 12 dB, a pair of Model 276's provide reliable communications of at least 2 km (6,600 ft) with standard cable. Model 276 power is supplied by a small, wall mounted transformer and line cord.

Model 276 Model 276-220 RS-485 (25F) to Fiber optic converter, 110 VAC power, ST fiber connectors RS-485 (25F) to Fiber optic converter, 220 VAC power, ST fiber connectors

Fiber-optic Cable

CFO-ST-100 CFO-ST-200 CFO-ST-300 CFO-ST-500 Multimode Fiber Optic Cable, 100 foot, interior Multimode Fiber Optic Cable, 200 foot, interior Multimode Fiber Optic Cable, 300 foot, interior Multimode Fiber Optic Cable, 500 foot, interior CFO-ST-100EXT CFO-ST-200EXT CFO-ST-300EXT CFO-ST-500EXT Multimode Fiber Optic Cable, 100 foot, exterior Multimode Fiber Optic Cable, 200 foot, exterior Multimode Fiber Optic Cable, 300 foot, exterior Multimode Fiber Optic Cable, 500 foot, exterior

Serial Communications Cables, Gender Changers and Adaptors



Serial I/O Cables C25F9M-10

C25F9M-25 C25F9M-50 C9FM-10 C9FM-25 C9FM-50 Cable, 25-pin F, to 9-pin M cable, 10 ft Cable, 25-pin F, to 9-pin M cable, 25 ft Cable, 25-pin F, to 9-pin M cable, 50 ft Cable, 9-pin M, to 9-pin F cable, 10 ft Cable, 9-pin M, to 9-pin F cable, 25 ft Cable, 9-pin M, to 9-pin F cable, 50 ft

C9FF-10 C9MM-10 C25FM-10 C25FF-10 C25MM-10 Cable, 9-pin F, to 9-pin F cable, 10 ft Cable, 9-pin M, to 9-pin M cable, 10 ft Cable, 25-pin M, to 25-pin F cable, 10 ft Cable, 25-pin F, to 25-pin F cable, 10 ft Cable, 25-pin M, to 25-pin M cable, 10 ft

Serial I/O Adaptors and Gender Changers

SADP-9FF

Adaptor, 9-pin M, to 9-pin M Adaptor, 9-pin F, to 9-pin F Adaptor, 25-pin M, to 25-pin M

SADP-25MM SADP-25FF

Adaptor, 25-pin F, to 25-pin F

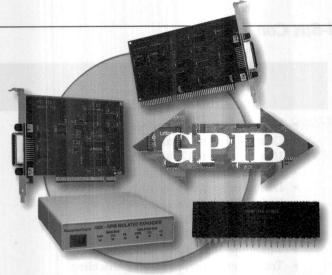
Serial I/O Adaptors and Gender Changers

SADP-25F9M SADP-25M9F

Adaptor, 25 pin F, to 9-pin M Adaptor, 25-pin M to 9-pin F

SADP-25FM-NM SADP-9FM-NM Adaptor, 25-pin M, to 25-pin F, null modem Adaptor, 9-pin M, to 9-pin M, null modem

GPIB/IEEE-488.2



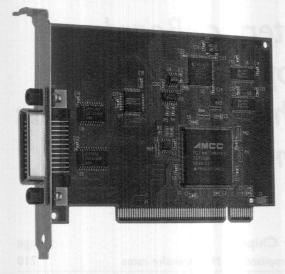
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Premium Quality, Superior Performance and Low Prices.

PCI-GPIB

High-Performance IEEE-488.2 Interface for PCI-Bus Computers



Description

The PCI-GPIB IEEE-488 interface converts any PCI bus personal computer into an instrumentation control and data acquisition system. Connect up to 14 instruments using standard IEEE-488 cables such as the C488-2M, 2 meter IEEE-488 interface cable. The PCI-GPIB is based on ComputerBoards' powerful CB7210.2 GPIB chip.

Greater than 1MB/s Transfer Rates

The PCI-GPIB transfers data over the GPIB at rates in excess of 1 million bytes per second using the maximum IEEE-488 specification cable length (2 meters times the # of devices).

ComputerBoards' advanced high-speed, State Machine Bus Manager and the powerful CB7210.2 chip assure the board is able to maintain its high data transfer rate over the GPIB bus. A 1024-word FIFO buffer and the advanced REP-INSW ISR data transfer method provide the horse-power required to then transfer the data between the GPIB board and the host computer. The high-speed state machine also provides byte-to-word packing and unpacking, and because words carry twice the information that bytes do, packed data requires fewer bus cycles to transfer the same GPIB information.

IEEE-488.2 (GPIB) Compatibility

The PCI-GPIB adheres to ANSI/IEEE Standard 488-1978. Often referred to as the IEEE-488.2 bus, GPIB bus or HP-IB bus, the GPIB (General Purpose Interface Bus) is a standard for instrumentation communication and control for instruments from manufacturers the world over. The GPIB provides handshaking and interface communications over an 8-bit data bus employing 5 control and 3 handshake signals.

Equipped with a PCI-GPIB, a personal computer can:

Control GPIB instruments.

Gather data from GPIB test equipment.

Become a data acquisition station in a GPIB system.

Features

- IEEE 488.2 Standard interface
- Complete Talker/Listener/Controller
- Uses powerful CB7210.2 chip
- · Industry Standard 32-bit PCI bus
- · Data transfer rates over 1 Megabytes/sec
- REP-INSW block transfer
- 1024-word FIFO buffer
- High-Speed State Machine Bus Manager
- 7 Interrupt lines, shared interrupt capability
- Transparent interrupt enabling/disabling

Includes GPIB-Library software

Plug & Play - No switches or jumpers

The PCI-GPIB is true Plug and Play. Plug in the PCI-GPIB, run the installation software, then start communicating. The Plug and Play specification is a standard for system configuration of boards and software which automatically configures the PCI-GPIB.

Software

The PCI-GPIB includes ComputerBoards' powerful GPIB-Library. The library greatly simplifies your programming effort. The PCI-GPIB is also supported by a wide variety of application software packages including SoftWIRE, LabVIEW and many others.

Windows 95/98/2000/NT/3.x and DOS Compatibility

The PCI-GPIB hardware supports all popular operating systems and languages regardless of the operating systems support for Plug and Play. The installation software will manage resources for you on non-Plug and Play systems.

Specifications

IEEE compatibility
Maximum Transfer Rate

Power
I/O Connector
Operating Temp. & Hum.
Storage Temp. & Hum.

IEEE-488.1 and IEEE-488.2 PCI-GPIB-1M >1 Mbyte/s PCI-GPIB-300K 300 Kbyte/s 5 Vdc @ 375 mA Typical IEEE-488 Standard 24 pin 0-60 degrees C @ 0-90% -40 to 100 degrees C @ 5-90%

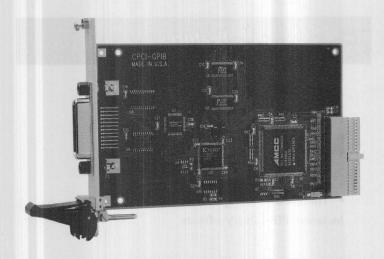
Ordering Guide

PCI-GPIB-1M 1 MHz, PCI bus GPIB Interface board
PCI-GPIB-300K 300 kHz, PCI bus GPIB Interface board
C488-2M 2 meter GPIB cable

ack mount for 1876, 486X

CPCI-GPIB

High-Performance IEEE-488.2 Interface for CompactPCI-Bus Computers



Features

- IEEE 488.2 Standard interface
- Complete Talker/Listener/Controller
- Uses powerful CB7210.2 chip
- · Data transfer rates over 1 Megabytes/sec
- · REP-INSW block transfer
- 1024-word FIFO buffer
- High Speed State Machine Bus Manager
- · 7 Interrupt lines, shared interrupt capability
- · Transparent interrupt enabling/disabling

Includes GPIB-Library software

Description

The CPCI-GPIB IEEE-488 interface converts any CompactPCI bus personal computer into an instrumentation control and data acquisition system. Connect up to 14 instruments using standard IEEE-488 cables such as the C488-2M, 2 meter IEEE-488 interface cable. The CPCI-GPIB is based on ComputerBoards' powerful CB7210.2 GPIB chip.

Greater than 1 MB/s Transfer Rates

The CPCI-GPIB transfers data over the GPIB at rates in excess of 1 million bytes per second using the maximum IEEE-488 specification cable length (2 meters times the # of devices).

ComputerBoards' advanced high-speed, State Machine Bus Manager and the powerful CB7210.2 chip assure the board is able to maintain its high data transfer rate over the GPIB bus. A 1024-word FIFO buffer and the advanced REP-INSW ISR data transfer method provide the horse-power required to then transfer the data between the GPIB board and the host computer. The high-speed state machine also provides byte-to-word packing and unpacking and since words carry twice the information bytes do, packed data requires fewer bus cycles to transfer the same GPIB information.

IEEE-488.2 (GPIB) Compatibility

The CPCI-GPIB adheres to ANSI/IEEE Standard 488-1978. Often referred to as the IEEE-488.2 bus, GPIB bus or HP-IB bus, the GPIB (General Purpose Interface Bus) is a standard for instrumentation communication and control for instruments from manufacturers the world over. The GPIB provides handshaking and interface communications over an 8-bit data bus employing 5 control and 3 handshake signals.

Equipped with a CPCI-GPIB, a personal computer can:

Control GPIB instruments.

Gather data from GPIB test equipment.

Become a data acquisition station in a GPIB system.

Plug & Play - No switches or jumpers

The CPCI-GPIB is a true Plug and Play. Plug in the PCI-GPIB, run the installation software then start communicating. The Plug and Play specification is a standard for system configuration of boards and software which automatically configures the PCI-GPIB.

Software

The CPCI-GPIB includes ComputerBoards' powerful GPIB-Library. The library greatly simplifies your programming effort. The PCI-GPIB is also supported by a wide variety of application software packages including SoftWIRE, LabVIEW and many others.

Windows 95/98/2000/NT/3.x and DOS Compatibility

The CPCI-GPIB hardware supports all popular operating systems and languages regardless of the operating systems support for Plug and Play. The installation software will manage resources for you on non-Plug and Play systems.

Specifications

IEEE compatibility
Transfer Rate
Power
I/O Connector
Operating Temp. & Hum.
Storage Temp. & Hum.

IEEE-488.1 and IEEE-488.2 >1 Mbyte/sec 5 Vdc @ 375 mA typical IEEE-488 Standard 24-pin 0-60 degrees C @ 0-90% -40 to 100 degrees C @ 5-90%

Ordering Guide

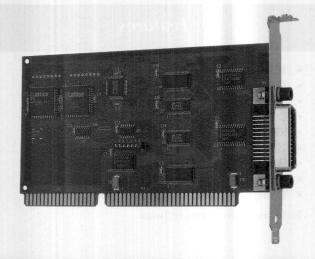
CPCI-GPIB GPIB Interface board for CompactPCI

compatible computers.

C488-2M 2 meter GPIB cable

ISA-GPIB

High-Performance IEEE-488.2 Interface for ISA-Bus Computers



Features

- · IEEE 488.2 Standard interface
- Complete Talker/Listener/Controller
- Uses powerful CB7210.2 chip
- Data transfer rates over 1 Megabytes/sec
- · REP-INSW block transfer
- · 1024-word FIFO buffer
- High Speed State Machine Bus Manager
- · 7 Interrupt lines, shared interrupt capability
- · Transparent interrupt enabling/disabling

Includes GPIB-Library software

Functional Description

The ISA-GPIB IEEE-488 interface converts any ISA bus personal computer into an instrumentation control and data acquisition system. Connect up to 14 instruments using standard IEEE-488 cables such as the C488-2M, 2 meter IEEE-488 interface cable. The PCI-GPIB is based on ComputerBoards' powerful CB7210.2 GPIB chip.

Greater than 1MB/s Transfer Rates

The ISA-GPIB transfers data over the GPIB at rates in excess of 1 million bytes per second using the maximum IEEE-488 specification cable length (2 meters times the # of devices).

ComputerBoards' advanced high speed, State Machine Bus Manager and the powerful CB7210.2 chip assure the board is able to maintain its high data transfer rate over the GPIB bus. A 1024 Word FIFO buffer and the advanced REP-INSW ISR data transfer method provide the horse-power required to then transfer the data between the GPIB board and the host computer. The high speed state machine also provides byte-to-word packing and unpacking and since words carry twice the information bytes do, packed data requires fewer bus cycles to transfer the same GPIB information.

IEEE-488.2 (GPIB) Compatibility

The ISA-GPIB adheres to ANSI/IEEE Standard 488-1978. Often referred to as the IEEE-488.2 bus, GPIB bus or HP-IB bus, the GPIB (General Purpose Interface Bus) is a standard for instrumentation communication and control for instruments from manufacturers the world over. The GPIB provides handshaking and interface communications over an 8 bit data bus employing 5 control and 3 handshake signals.

Equipped with a PCI-GPIB, a personal computer can:

Control GPIB instruments.

Gather data from GPIB test equipment.

Become a data acquisition station in a GPIB system.

One switch, no jumpers

The ISA-GPIB is so easy to install. Select a base address, plug in the ISA-GPIB and run the installation software then start communicating. The installation software automatically configures the interrupt level and DMA level of the ISA-GPIB.

Software

The ISA-GPIB includes ComputerBoards' powerful GPIB-Library. The library greatly simplifies your programming effort. The PCI-GPIB is also supported by a wide variety of application software packages including SoftWIRE, LabVIEW and many others.

Windows 95/98/2000/NT/3.x and DOS Compatibility

The ISA-GPIB supports virtually all popular operating systems and languages. From legacy applications in DOS to the most modern applications in the newest version of Windows, ComputerBoards is dedicated to providing the support you need.

Specifications

IEEE compatibility IEEE-488.1 and IEEE-488.2
Transfer Rate >1 Mbyte/sec
Power 5 Vdc @ 375 mA Typical
I/O Connector IEEE-488 Standard 24 pin

Operating Temp. & Hum.

0-60 degrees C @ 0-90%

Storage Temp. & Hum.

-40 to 100 degrees C @ 5-90%

Ordering Guide

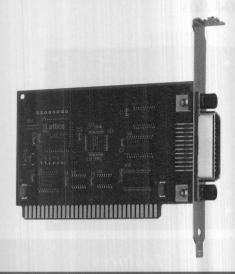
ISA-GPIB GPIB Interface board for ISA-bus

compatible computers.

C488-2M 2 meter GPIB cable

ISA-GPIB/Ic

Low-Cost IEEE-488.2 Interface for ISA-Bus Computers



Functional Description

The ISA-GPIB/Ic IEEE-488 interface converts any ISA bus personal computer into an instrumentation control and data acquisition system. Connect up to 14 instruments using standard IEEE-488 cables such as the C488-2M, 2 meter IEEE-488 interface cable. The PCI-GPIB is based on ComputerBoards' powerful CB7210.2 GPIB chip.

Greater than 300 MB/s Transfer Rates

The ISA-GPIB/Ic transfers data over the GPIB at rates in excess of 300 kbytes per second. Full DMA and interrupt structures provide all the horsepower required to achieve these rates.

The CB7210.2 IEEE-488 controller combined with the DMA interface are able to keep pace with the transfer of information to and from instruments at rates in excess of 300 Kbytes per second. The CB7210.2 is able to communicate directly with the DMA circuitry since the GPIB bus, CB7210.2 and ISA (XT) bus are all eight bit based.

Worried that you may need more than 300 kB/s? Consider that most GPIB instruments will not transfer data faster than the ISA-GPIB/LC will, and that most applications are simple, low speed stimulus/test/log systems. The ISA-GPIB/LC is more than fast enough for most applications and saves money in cases where many test stands are being deployed.

IEEE-488.2 (GPIB) Compatibility

The ISA-GPIB/lc adheres to ANSI/IEEE Standard 488-1978. Often referred to as the IEEE-488.2 bus, GPIB bus or HP-IB bus, the GPIB (General Purpose Interface Bus) is a standard for instrumentation communication and control for instruments from manufacturers the world over. The GPIB provides handshaking and interface communications over an 8 bit data bus employing 5 control and 3 handshake signals.

Features

- IEEE 488.2 Standard interface
- Complete Talker/Listener/Controller
- Uses powerful CB7210.2 chip
- Data transfer rates over 300 kilobytes/sec
- Extremely low cost
- · 7 Interrupt lines, shared interrupt capability
- · Transparent interrupt enabling/disabling

Includes GPIB-Library software

One switch, no jumpers

The ISA-GPIB/Ic is so easy to install. Select a base address, plug in the ISA-GPIB/Ic and run the installation software then start communicating. The installation software automatically configures the interrupt level and DMA level of the ISA-GPIB/Ic.

Software

The ISA-GPIB/lc includes ComputerBoards' powerful GPIB-Library. The library greatly simplifies your programming effort. The PCI-GPIB is also supported by a wide variety of application software packages including SoftWIRE, LabVIEW and many others.

Windows 95/98/2000/NT/3.x and DOS Compatibility

The ISA-GPIB/lc supports virtually all popular operating systems and languages. From legacy applications in DOS to the most modern applications in the newest version of Windows, ComputerBoards is dedicated to providing the support you need.

Specifications

IEEE compatibility
Transfer Rate
Power
I/O Connector
Operating Temp. & Hum.
Storage Temp. & Hum.

IEEE-488.1 and IEEE-488.2 >300 kbyte/sec 5 Vdc @ 300 mA typical IEEE-488 Standard 24 pin 0-60 Degrees C@ 10-90% -40 to 100 Degrees C @ 5-90%

Ordering Guide

ISA-GPIB/lc Low-cost GPIB interface board for ISA-bus compatible computers.

C488-2M 2 meter GPIB cable

PCM-GPIB

High-Performance IEEE-488.2 Interface for the PCMCIA Bus



Features

- IEEE 488.2 Standard interface
- Complete Talker/Listener/Controller
- · Uses powerful CB7210.2 chips
- Data transfer rates over 1 Megabytes/sec
- · REP-INSW block transfer
- 1024-word FIFO buffer
- High-Speed State Machine Bus Manager
- 7 Interrupt lines, shared interrupt capability
- Transparent interrupt enabling/disabling

Includes GPIB-Library software

Description

The PCM-GPIB IEEE-488 interface converts any PCMCIA bus personal computer into an instrumentation control and data acquisition system. The PCM-GPIB offers GPIB transfer rates in excess of 1 Megabyte per second. The PCM-GPIB is designed around ComputerBoards' powerful CB7210.2 GPIB chip.

Specifications

IEEE compatibility
Transfer Rate
Power
Dimensions
I/O Connector

IEEE-488.1 and IEEE-488.2. >1 Mbyte/sec 5 Vdc@ 150 mA Typical PCMCIA Type II

I/O Connector
Operating Temp. & Hum.
Storage Temp. & Hum.
Storage Temp. & Hum.
33-pin to IEEE-488 Standard
0-50 Degrees C@ 10-90%
-55 to 125 Degrees C@ 5-90%

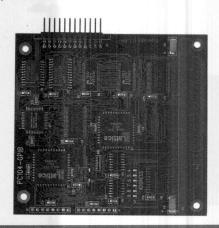
Ordering Guide

PCM-GPIB

GPIB Interface board for PCMCIA compatible computers. Includes GPIB interface cable.

PC104-GPIB

High-Performance IEEE-488.2 Interface for the PC/104 Bus



Features

- IEEE 488.2 Standard interface
- · Complete Talker/Listener/Controller
- Uses powerful CB7210.2 chip
- Data transfer rates over 1 Megabytes/sec
- REP-INSW block transfer
- 1024-word FIFO buffer
- High-Speed State Machine Bus Manager
- · 7 Interrupt lines, shared interrupt capability
- Transparent interrupt enabling/disabling

Includes GPIB-Library software

Description

The PC104-GPIB IEEE-488 interface converts any PC/104-bus personal computer into an instrumentation control and data acquisition system. The P104-GPIB offers GPIB transfer rates in excess of 1 Megabyte per second. The P104-GPIB is designed around ComputerBoards' powerful CB7210.2 GPIB chip.

Specifications

IEEE compatibility
Transfer Rate
Power
Dimensions
I/O Connector
Operating Temp. & Hum.
Storage Temp. & Hum.

IEEE-488.1 and IEEE-488.2 >1 Mbyte/sec 5 Vdc @ 350 mA Typical PC/104 compliant 24-pin header w/mating cable 0-60 degrees C @ 10-90% -40-70 degrees C @ 5-90%

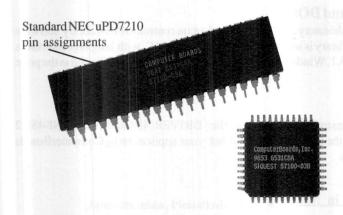
Ordering Guide

PC104-GPIB

GPIB Interface board for PC/104-bus compatible computers. Includes GPIB interface cable.

CB7210.2

High-Performance IEEE-488.2 Controller, Talker, Listener Integrated Circuit



Description

The CB7210.2 is a new GPIB controller chip replacing the NEC uPD7210. Like many OEMs facing the eventual phase out of the NMOS NEC uPD7210, ComputerBoards needed a replacement and needed it to embrace the latest technology, preserve legacy code and circuitry, and be available at a great price. So we designed one from the ground up.

The Ideal Chip for your next design

You should use the CB7210.2 in your next OEM design. With an open design, unparalleled software support, advanced support circuitry, low cost and backed by ComputerBoards, the CB7210.2 is perfect for your next design.

High Speed State Machine Bus/FIFO Manager

An advanced state machine designed to handle bus transfers and a FIFO specifically for the CB7210.2 has been developed and is available for the ISA, PCMCIA and PCI bus. Please call us for further details regarding our high-speed GPIB support designs.

IEEE-488.2 (GPIB) Compatibility

The CB7210.2 adheres to ANSI/IEEE Standard 488-1978, and the update to the IEEE-488.2 specification. The IEEE-488 bus or GPIB (General Purpose Interface Bus) is a standard for instrumentation communication and control for instruments from manufacturers the world over.

CMOS Technology

The original uDP7210 was built in NMOS technology. State of the art then, but today's CMOS based chips are typically faster, consume less power, have equivalent drive capabilities and higher input impedances.

VHDL Source Available

The CB7210.2 is designed entirely in VHDL code and implemented as the state machines defined in the IEEE-488.2 specification, the NEC uPD7210 data book and includes state machines which implement advanced functions. This VHDL code is available to manufacturers and OEMs designing systems and chips for GPIB instrumentation, control and analysis.

Features

- MEETS IEEE STANDARD 488.2-1992
 - SH1. SOURCE HANDSHAKE
 - AH1, ACCEPTOR HANDSHAKE
 - T5 or TE5, Talker or Extended Talker
 - L3 or LE3, Listener or Extended Listener
 - SR1, SERVICE REQUEST
 - RL1, REMOTE LOCAL
 - PP1 or PP2, Parallel Poll, Remote or Local Configuration
 - DC1. DEVICE CLEAR
 - DT1. DEVICE TRIGGER
 - C1-C5, CONTROLLER, ALL FUNCTIONS
- PROGRAMMABLE DATA TRANSFER RATE
- 16 REGISTERS, 8 READ/8 WRITE
- 2 Address Registers
- DETECTION OF MTA, MLA, MSA (MY TALK/MYLISTEN/MY SECONDARY ADDRESSES)
- 2 Device Addresses
- EOS Message Automatic Detection
- COMMAND (IEEE STANDARD 488-78) AUTOMATIC PROCESSING AND UNDEFINED COMMAND READ CAPABILITY
- DMA CAPABILITY
- Programmable bus transceiver I/O specification (works with Texas Instruments/Motorola/Intel-compatible
- 1 MHz to 20 MHz* Clock Range
- CAN MONITOR ALL BUS CONTROL LINES*
- SUPPORTS T1 DELAYS OF 2000, 500, 350 NS*
- +5V SINGLE POWER SUPPLY
- CMOS Technology*
- 8080/85/86/Pentium Compatible
- AVAILABLE IN 40 PIN DIP AND 44 PIN TOFP* PACKAGES
- ADDS 488.2 FEATURES TO NEC-7210 DESIGN*

*Items in RED and marked with an asterisk are enhancements added to the original uPD7210 design.

For a complete CB7210 data sheet please visit: www.computerboards.com/cb7210

Ordering Guide

CB7210.2-PDIP

CB7210 chip in 40-pin plastic

DIP package

CB7210.2-TQFP

CB7210 chip in 44-pin TQFP

package

GPIB Software

Language Library for Windows 3.1, Win95/98/2000, Win/NT and DOS

The GPIB-Library software allows you to create application programs for test, laboratory analysis and production control. GPIB-Library software is a complete library of routines for GPIB communication and control. GPIB-Library is written in x86 Assembler and C, with language interfaces for commonly used programming languages. The Library for DOS & Windows 3.1, Windows 95/98/2000 and Windows NT is included in the price of each board.

Based on the NI-488.2 and DRIVER-488

The syntax of the library routines is modeled on syntax used by National Instruments in their earlier DRIVER-488 and current NI-488.2 programmer's library. If your current programs use the syntax shown below, then you can easily switch your application to ComputerBoards IEEE-488.2 products and take advantage of all the ComputerBoards benefits.

NI-488.2 Command Library

Syntax in Basic

ibask(boarddev%, option%, value%)

ibbna(device%, boardname\$)

ibcac(board%, sync%)

ibclr(device%)

ibcmd(board%, cmnd\$, bytecount%)

ibcmda(board%, cmnd\$)

ibconfig(boarddev%, option%, value%)

ibdev(board.index%, pad%, sad%,

timeout%, eot%, eos%, device%)

ibdma(device%, dma%)

ibeos(boarddev%, eos%)

ibeot(boarddev%, eot%)

ibevent(board%, event%)

ibfind (udname\$, device%)

ibgts(goard%, handshake%)

ibinit(board%)

ibist(board%, statusbit%)

iblines(board%, clines%)

obloc(boarddev%)

ibln(board%, pad%, sad%, listen%)

ibonl(boarddev%, online%)

ibpad(boarddev%, address%)

ibpct(device%)

ibppc(board%, commmand%)

ibrd (boarddev%,rd\$)

ibrda(boarddev%, buf\$)

ibrdf(boarddev%, filename\$)

ibrdi(boarddev%, iarr%, bytecount&)

ibrdria(boarddev%iarr%, bytecount%)

ibrsc(board%, control%)

ibrsp(device%, serialpollbyte%)

ibrsv(boarddev%, statusbyte%)

ibsad(device%, address%)

ibsic(board%)

ibsre(board%, ren%)

ibsrq(void(far *SRQ_Function)void)

ibstop(boarddev%)

ibtmo(boarddev%, timeout%)

ibtrg(device%)

ibwait(boarddev%, mask%)

ibwrt (boarddev%, wrt\$)

ibwrta(boarddev%, buf\$)

ibwrtf(boarddev%, filename\$)

ibwrti(boarddev%, iarr%, bytecount&)

ibwrtia(boarddev%, iarr%, bytecount&)

IEEE-488.2 Commands in NI-488.2

Syntax in Basic

AllSpoll(board%, addresslist%(),

resultlist%())

DevClear(board%, address%)

DevClearList(board%, addresslist%())

EnableLocal(board%, addresslist%())

EnableRemote(board%, addresslist%())

FindLstn(board%, addresslist%(),

resultlist%(), limit%)

FindRqs(board%, addresslist%(), result%)

PassControl(board%, address%)

PPoll(board%, result%)

PPollConfig(board%, address%, dataline%,

sense%)

PPollUnconfig(board%, addresslist%())

RecvRespMsg(board%, data\$, termination%)

ReadStatusByte(board%, address%, result%)

Receive(board%, address%, data\$,

termination%)

ReceiveSetup(board%, address%)

ResetSys(board%, addresslist%())

Send(board%, address, data\$, eotmode%)

SendCmds(board%, commands\$)

SendDataBytes(board%, data\$, eotmode%)

SendIFC(board%)

SendList(board%, addreslist%(), data\$,

eotmode%)

SendLLO(board%)

SendSetup(board%, addresslist%())

SetRWLS(board%, addresslist%())

TestSrq(board%, result%)

TestSys(board%,addresslist%(), resultlist%())

Trigger(board%, address%)

TriggerList(board%, addresslist%())

WaitSRQ(board%, result%)

C488-2M Cable



Description

The C488-2M is a standard 2-meter GPIB cable. The cable is designed to connect any of ComputerBoards' GPIB boards to your instrument(s).

GPIB Extenders and I/O Interfaces

GPIB-4894A GPIB to Serial Interface



Features

- Rate generator provides any baud rate from 50 to >115.2 kbaud.
- Flexible serial interface drives RS-232/RS-422 or RS-485 devices.
- Large RAM buffers 252,000 bytes of data to off load the GPIB Bus Controller.

Functional Description

The GPIB-4894A converts any device with an RS-232, RS-422 or RS-485 serial interface into an IEEE-488.2 device. The GPIB-4894A runs in full or half duplex modes and provides transparent data transfers. The unit's serial interface settings and GPIB address are programmable over the GPIB bus. This configuration is saved in EEPROM and becomes the power on configuration for the next power on cycle. The GPIB-4984A can also be reversed and allows a serial port to control a single GPIB device.

GPIB-4895 Serial to GPIB Controller



Features

- Uses HP BASIC like commands with SCPI support
- 192 k command and data buffers for fast data input.
- Allows PC to control remote GPIB systems via modem or standard serial link.
- 4895 configuration changeable by serial or GPIB commands.
- 300 to 38.4 kbaud serial rates

Functional Description

The GPIB-4895 allows you to control the GPIB bus from any RS-232, RS-422 or RS-485 Serial source. Using high-level, Basic-like commands a PC may easily control remote GPIB systems. May also be operated in reverse as a GPIB-to-serial -nterface.

GPIB-4896 GPIB to Quad Serial Interface

Features

- High-speed serial channels with rates up to 115.2 kbaud and 60-kbyte buffers.
- Full or half duplex operation in RS-485 mode.
- LCD display shows GPIB status, serial activity, buffer status and serial signal levels.



Functional Description

The GPIB-4896 provides four RS-232/RS-485 serial ports controlled by the GPIB bus. Each serial channel includes a 60-kbyte buffer and allows full or half duplex operation at speeds up to 115.2 kbps. The unit includes a front panel LCD display that shows bus status, activity levels, serial interface signals as well annunciating errors and performing self tests. The unit includes a menu-driven, PC compatible configuration/set up program.

GPIB-4860 Bus Isolator & Expander



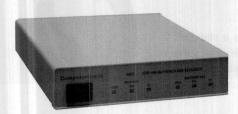
Features

- · Automatic controller location, no address switches to set.
- Invisible to bus controller works in any IEEE-488 or GPIB-bus system.
- Small internal signal delay does not degrade system performance.
- Provides >1500 volts of isolation between two bus devices.

Functional Description

The GPIB-4860 Expander increases bus fanout and allows a GPIB controller to drive up to 14 additional devices and an extra 20 meters of bus cable. The unit is invisible to the GPIB controller and does not require any additional programming. The unit's 600 ns handshake delay allows data transfer rates of up to 600 kbytes per second. The GPIB-4860 offers 1500 Vdc or isolation and reduces ground loop and common mode voltage problems.

GPIB-4862 Bus Expander



Features

- Automatic Controller location, no address switches to set.
- Invisible to bus controller works in any IEEE-488 or GPIB Bus System.
- Small internal signal delay does not degrade system performance.
- Lower cost, non-isolated version of the GPIB-4860

Functional Description

The GPIB-4862 Expander increases bus fanout and allows a GPIB controller to drive up to 14 additional devices and an extra 20 meters of bus cable. The unit is invisible to the GPIB controller and does not require any additional programming. The unit's 600 ns handshake delay allows data transfer rates of up to 600 kbytes per second. The GPIB-4862 is a non-isolated, lower cost version of the GPIB-4860.

GPIB-4861 series GPIB Based Analog I/O



Features

GPIB-4861-24

- 4 Channels, differential 12-bit A/D
- 4 Channels, 12-bit analog output
- 6 bits digital input, 4 bits digital out
- 750 Vdc isolation from the GPIB

GPIB-4861-14 & GPIB-4861-12

- 4 Channels, 12-bit analog output (-14)
- 2 Channels, 12-bit analog output (-12)
- 6 bits digital input, 4 bits digital out
- 750 Vdc isolation from the GPIB

Functional Description

The GPIB-4861 series allows a GPIB-based system to monitor analog input signals and control analog output signals. The units also provide digital inputs and outputs to monitor and control a wide array of digital devices. The 4861 uses both SCPI commands for self-documentation and easy programming. The GPIB-4861 series is an ideal solution for a wide assortment of automated test and measurement applications.

Specifications

Analog Inputs (-24 unit only)			Analog Outputs (continued)		
	Input channels	4, fully differential	Output current	5 mA min, 10 mA typ.	
	Resolution	12-bit (1 part in 4096)	Output noise	30 mV p-p	
	Input ranges	0-10, 0-1, 0-0.1 Vdc or	Update delay	45 ms from command	
		±10, ±1 ±0.1 Vdc		terminator	
	Sample rate	15 samples/sec			
	Input impedance	1 Megohm, min	Digital I/O		
	Input accuracy	±2 lsb	Inputs	6, CMOS compatible with	
	see GP1			33 kilohm pullup resistors	
	Analog Outputs		Input response	50 ms to GPIB	
	Channels	4 (-14, -24 versions)	Outputs	4, darlington	
		2 (-12 version)	Output current	20 mA @ 0.7 V	
	Resolution	12-bit (1 part in 4096)		200 mA@ 1.2 V	
	Output ranges	0 - 10 Vdc or	VMax	48 Vdc	
	an 02 billi-3	±10 Vdc	Output delay	30 ms from CMD Term	

GPIB-4863 48-bit Digital Interface



Features

- Allows digital interfaces as input or output in 8 bit bytes to match his needs.
- Configuration saved in E²ROM.
- Output signals held in latches, pullup resistors provided for input signals.
- Output source 24 mA or sink 48 mA
- Monitors up to 15 inputs for state change and generates SRQ on change detection

Functional Description

The GPIB-4863 provides 48 digital lines for transferring parallel BCD/HEX or binary data to or from the GPIB bus. The digital I/O may be configured as input or output in 8-bit bytes. High current (48 mA sink, 24 mA source) logic minimizes external signal conditioning required.

GPIB-4864-11 Relay Output Interface



Features

- 16 form A contacts
- Relay contacts rated to 0.5 amp
- · Relays may be operated individually, or as a group
- Reads 8 digital lines or monitors the digital inputs for signal changes.

Functional Description

The GPIB-4864-11 provides GPIB controlled relay contacts controlling, scanning, or switching signals. The low 0.15 ohm relay resistance makes the GPIB-4864 and excellent multiplexer or signal switch box. The unit also provides an 8-bit digital input port.

GPIB-4000 series accessories

GPIB-114534-60	Rack mount terminal board for 4864 interfa
GPIB-4860-CON	4860 series I/O connector with hood
GPIB-RMT-210	Single unit rack mount for 4894A. 4895
GPIB-RMT-211	Double unit rack mount for 4894A, 489
GPIB-RMT-212	Single unit rack mount for 4896, 486X
GPIB-RMT-213	Double unit rack mount for 4896, 486X

C488-2M Cable

Description

The C488-2M is a standard 2-meter GPIB cable. The cable is designed to connect any of ComputerBoards' GPIB boards to your instrument(s).



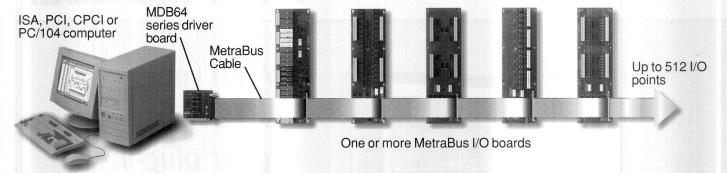
The MetraBus



When your application is too big for plug-in boards, but you still want plug-in board prices

Driver Boards		Page
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MetraBus Family Concept



Introduction

The MetraBus is a powerful, low-cost, easily expandable data acquisition, control, test, and monitoring solution. Ideal for systems that are too large for standard plug-in board solutions, but price sensitive enough to require board-level pricing. The MetraBus offers a wide variety of analog and digital I/O boards, and is compatible with most common, small computer architectures. The simple and robust MetraBus is extremely flexible and is ideally suited to a huge variety of applications.

The System Concept

The MetraBus concept is simple. Combine your computer, a MetraBus MDB64 series driver board, a cable, and one or more MetraBus I/O boards to form a complete computer-based system. Each MDB64 series driver board will interface to as many as 512 I/O points (up to 256 analog). Additional driver boards allow MetraBus systems with thousands of I/O points.

The MetraBus is an ideal solution in many smaller systems since the I/O boards are external to the computer, and can be installed up to 100 feet from the host computer. This allows your computer to reside in a control room, while the I/O boards are installed close to the actual device(s) being monitored and controlled.

The MetraBus was originally developed by MetraByte Corp. (now Keithley MetraByte). ComputerBoards' MetraBus boards are new designs, but remain compatible with the original MetraByte system. In fact, you're free to mix and match boards from both vendors within a system. If you would like to migrate your existing MetraBus system to the PCI, CPCI, or PC/104 bus, our driver boards will do the trick. Keithley MetraBus components are also supported by Computer-Boards' Universal Library. You can now create MetraBus systems based on our modern and comprehensive software library.

Computer Interface & Driver Boards

With driver boards for ISA, PCI, cPCI, and PC/104, the MetraBus is compatible with most common computer architectures. The PCI (part number PCI-MDB64) and cPCI (CPCI-MDB64) driver boards are fully plug-and-play and do not require any user hardware configuration. The ISA (ISA-MDB64) and PC/104 (P104-MDB64) driver boards require the user to set a single base address switch. The PCI- and CPCI-MDB64 also provide an on-board crystal controlled counter/timer that can be used to set system update timing, or may be used in watchdog timer implementations. For details on the MetraBus driver boards, please refer to their respective data sheets included later in this catalog section.

I/O Boards

ComputerBoards' MetraBus family currently consists of five digital I/O boards and three analog I/O boards. Other boards are in development and are expected to be released during 2000.

If you need to put your system together before our new boards are available, you may mix boards between the two vendors. Choose the ComputerBoards' MetraBus boards that are available, and feel free to use Keithley MetraBus boards for functions we have yet to release.

MetraBus Power Distribution & Cabling

All MetraBus driver boards provide up to 1 amp of power at +5 V. Small systems utilizing the MII-32 (250 mA), MIO-32 (650 mA), and/or MSSR-24 (400 mA) will not require an MBUS-PWR as the system will require less than 1 amp.

The MBUS-PWR is a 100-watt power supply. It is used to supply power to larger systems. A single MBUS-PWR provides enough power for all but the largest of systems. Additional MBUS-PWR boards may be added in very large systems where required.

The MetraBus cable connects all MetraBus I/O boards to the MDB64 driver board. Cables are in the form M-XX-YY-ZZ where XX is the total cable length in feet, YY is the number of I/O connectors installed and ZZ is the connector spacing in inches. Order custom cables using this numbering scheme, or provide a sketch with your order.

Software

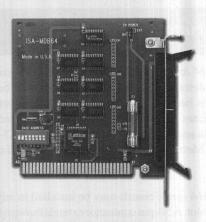
The MetraBus is fully supported by ComputerBoards' powerful Universal Library software. Universal Library is a full-featured driver that provides high-level intuitive I/O functions that make programming simple. Universal Library support also ensures that the MetraBus system is fully supported by a wide variety of application packages including SoftWIRE, DAS Wizard, HP VEE, HP VEE Lab and LabVIEW.

For those who choose to write register-level programs, the MetraBus is extremely straightforward. Simply write an I/O board address to the MDB64 driver board base address +1, then read/write your data from/to the MDB64's base address +0.

MetraBus Mounting Options

The MetraBus is supported by a wide variety of chassis and mounting options. From 19" racks to NEMA enclosures, from table-top systems to DIN Rail systems the MetraBus offers the rugged, low-cost, easy-to-install and high-density mounting system you need.

ISA-MDB64 MetraBus Driver Board for ISA-Bus Computers



Features

- Fully ISA compatible
- Controls or monitors up to 512 digital or 256 analog
 I/O points per ISA slot
- · Easy to use
- · High-speed parallel data transfers
- State-machine timing generation
- · Low cost
- Drives MetraBus cables as long as 100 feet

Functional Description

The ISA-MDB64 driver board is the primary control center of an ISA-based MetraBus system. The ISA-MDB64 board controls all I/O operations between the computer and MetraBus I/O boards. The board generates all timing and control signals, and controls all system-level data and address transfers. A single ISA-MDB64 can address up to 64 MetraBus I/O boards (up to 512 digital or 256 analog I/O points).

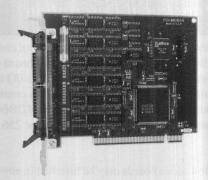
The ISA-MDB64 series boards may be installed in any compatible ISA expansion slot. A 50-pin connector extends through the rear of the computer and connects to the MetraBus 50-pin ribbon cable. The MetraBus uses parallel bus architecture with the MetraBus cable carrying all data, address, and control signals.

The ISA-MDB64 is easy to install. A single DIP switch selects the board's base I/O address. Programming ISA-MDB64 based MetraBus systems is very easy using direct I/O reads and writes, via Computer-Boards' Universal Library or by using SoftWIRE, DAS Wizard, or a wide variety of third party application software packages

Ordering Guide

ISA-MDB64 MetraBus Driver Board for ISA Bus Computers

PCI-MDB64 MetraBus Driver Board for PCI-Bus Computers



Features

- Fully PCI compatible
- Controls or monitors up to 512 digital or 256 analog
 I/O points per PCI slot
- Easy to use, fully plug-and-play
- On-board counter timer for interrupts or watchdog timer applications
- State-machine timing generation
- Low cost
- Drives MetraBus cables as long as 100 feet

Functional Description

The PCI-MDB64 driver board is the primary control center of a PCI-based MetraBus system. The PCI-MDB64 board controls all I/O operations between the computer and MetraBus I/O boards. The board generates all timing and control signals, and controls all system-level data and address transfers. A single PCI-MDB64 can address up to 64 MetraBus I/O boards (up to 512 digital or 256 analog I/O points).

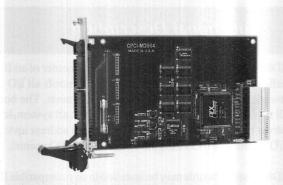
The PCI-MDB64 series boards may be installed in any compatible PCI expansion slot. A 50-pin connector extends through the rear of the computer and connects to the MetraBus 50-pin ribbon cable. The MetraBus uses parallel bus architecture with the MetraBus cable carrying all data, address, and control signals.

The PCI-MDB64 is fully plug-and-play and does not require any user hardware configuration. Programming PCI-MDB64 based MetraBus systems is very easy using direct I/O reads and writes, via Computer-Boards' Universal Library or by using SoftWIRE, DAS Wizard or a wide variety of third party application software packages.

Ordering Guide

PCI-MDB64 MetraBus Driver Board for PCI Bus Computers

CPCI-MDB64 MetraBus Driver Board for CompactPCI Computers



Features

- Fully CompactPCI compatible
- Controls or monitors up to 512 digital or 256 analog
 I/O points per CPCI slot
- On-board counter timer for interrupts or watchdog timer applications
- · Easy to use, fully plug-and-play
- · High speed parallel data transfers
- New state-machine timing generation
- · Low cost
- Drives MetraBus cables as long as 100 feet

Functional Description

The CPCI-MDB64 driver board is the primary control center of a CompactPCI-based MetraBus system. The CPCI-MDB64 board controls all I/O operations between the computer and MetraBus I/O boards. The board generates all timing and control signals, and controls all system-level data and address transfers. A single CPCI-MDB64 can address up to 64 MetraBus I/O boards (up to 512 digital or 256 analog I/O points).

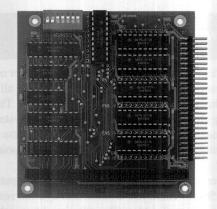
The CPCI-MDB64 series boards may be installed in any compatible CPCI expansion slot. A 50-pin connector extends through the rear of the computer and connects to the MetraBus 50-pin ribbon cable. The MetraBus uses parallel bus architecture with the MetraBus cable carrying all data, address, and control signals.

The CPCI-MDB64is fully plug-and-play and does not require any user hardware configuration. Programming CPCI-MDB64 based MetraBus systems is very easy using direct I/O reads and writes, via Computer-Boards' Universal Library or by using SoftWIRE, DAS Wizard or a wide variety of third party application software packages

Ordering Guide

CPCI-MDB64 MetraBus Driver Board for CompactPCI Computers

PC104-MDB64 MetraBus Driver Board for PC/104-Bus Computers



Features

- Fully PC/104 compatible
- Controls or monitors up to 512 digital or 256 analog I/O points perPC/104 slot
- · Easy to use
- · High speed parallel data transfers
- New state-machine timing generation
- · Low cost
- Drives MetraBus cables as long as 100 feet

Functional Description

The PC104-MDB64 driver board is the primary control center of a PC/104-based MetraBus system. The PC104-MDB64 board controls all I/O operations between the computer and MetraBus I/O boards. The board generates all timing and control signals, and controls all system-level data/address transfers. A single PC104-MDB64 addresses up to 64 MetraBus I/O boards (up to 512 digital or 256 analog I/O points).

The PC104-MDB64 series boards may be installed in any compatible PC/104 expansion slot. A 50-pin connector extends through the rear of the computer and connects to the MetraBus 50-pin ribbon cable. The MetraBus uses parallel bus architecture with the MetraBus cable carrying all data, address, and control signals.

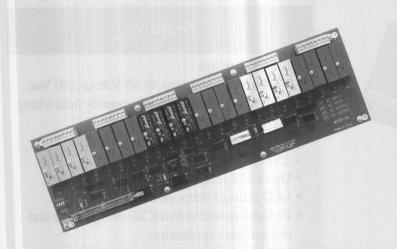
The PC104-MDB64 is easy to install. A single DIP switch selects the board's base I/O address. Programming PC104-MDB64 based Metra-Bus systems is very easy using direct I/O reads and writes, via ComputerBoards' Universal Library or by using SoftWIRE, DAS Wizard or a wide variety of third party application software packages

Ordering Guide

PC104-MDB64 MetraBus Driver Board for PC/104 Computers

MSSR-24

24-Bit Solid-State I/O Module Rack for the MetraBus



Features

- 24 industry standard solid state I/O modules
- · Uses standard full-size modules
- · Detachable screw terminals simplify field wiring
- 3-amp ac or dc outputs
- Monitors ac or dc inputs
- 4000-volt isolation
- Up to 384 modules per PC slot
- Mix and match inputs and outputs
- LED channel status indicators

Functional Description

The MSSR-24 is a 24-channel board that provides complete optical isolation for both high- and low-power switching applications. Each MSSR-24 monitors and controls 24 individual I/O points via optically isolated, solid-state, plug-in modules. The MSSR-32 uses industry standard, full-size solid state I/O modules. A variety of these modules are available in both input and output configurations. Voltages of 120/ 130 Vac, 0 to 60 Vdc, and standard European line voltages can be sensed and controlled. The standard modules offer 4000 volts of electrical isolation and offer output currents up to 3 amps.

Some common uses of the MSSR-24 include computer control of pumps and compressors, ON/OFF motor control, energy and HVAC management, alarm monitoring and activation, temperature control as well as numerous other monitoring and control functions.

The MSSR-24 uses three consecutive addresses on the MetraBus. This allows a single MDB64 series interface board to access up to 16 MSSR-24 boards, providing control of up to 384 individual I/O points. The MSSR-24 board has three, 8-bit ports. Writing to a port loads data into the output latches and to the I/O modules themselves. Reading data from an output module returns the data currently in the output latch without changing it. This feature allows the user to verify that the data on the outputs has been received correctly. Reading an input module returns the value of the input. Inputs and outputs may be mixed within a port. All MSSR-24 modules are set to the OFF state at power-up or upon a software CLEAR.

Detachable screw terminals on the MSSR-24 simplify field wiring, and accept standard 12-22 AWG wire sizes. The MSSR-24 is compatible with all MetraBus mounting and installation chassis and hardware, making it easy to install the boards in NEMA chassis, in 19-inch rack, on DIN rails, or on any flat surface.

MetraBus programming is very easy. You may write direct register I/O programs, take advantage of the Universal Library, or use SoftWIRE, DAS Wizard, or any of a wide variety of compatible software packages.

Specifications

Digital Input/Output

24 (3 banks of 8 modules) Number of channels 4 consecutive address locations Address space requirement

in the MetraBus address space

Detachable screw terminal

Connectors

Module I/O connector type

Voltage rating 300 V max. 12-22AWG Wire sizes

External power connector 4-pin PC power type

Power Consumption

+5V (all modules in off state) 250 mA typical, 300 mA max. +5V (all modules in on state) 375 mA typical, 425 mA max.

Environmental

Operating Temperature: 0 to 70°C Storage Temperature: -40 to 100° C

Physical

Size: 16 x 4.8 inches (40.64 x 12.192 cm)

Ordering Guide

I/O Modules

SSR-ODC-05 0-60 Vdc output module SSR-ODC-05A 0-200 Vdc output module SSR-OAC-05 24-140 Vac output module SSR-OAC-05A 24-280 Vac output module 3-32 Vdc input module SSR-IDC-05

SSR-IDC-05NP 10-32 Vdc / 15-32 Vac input module

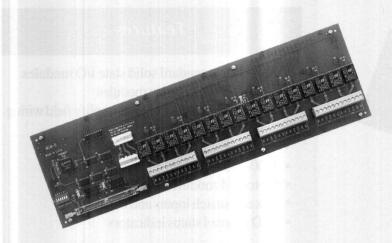
SSR-IAC-05 90-140 Vac input module 24-280 Vac input module SSR-IAC-05

Please see pages 177-178 for further details on solid-state I/O modules.

MSSR-24 24-point MetraBus solid state I/O module rack

MEM-8

8-Point Electromechanical Relay Board for the MetraBus



Functional Description

The MEM-8 is an 8-channel, double-pole, double-throw (DPDT) electromechanical relay board used with the MetraBus industrial data acquisition and control system. The MEM-8 uses eight pairs of SPDT electromechanical relays operating in parallel to provide a total of eight DPDT channels.

The MEM-8 relays offer 7 amp contact ratings at 30 Vdc and 120 Vac and 5 amp ratings at up to 240 Vac. These high ratings allow the MEM-8 to control all but the largest loads and motor starters. The low 70 milliohm contact ratings also assure that the MEM-8 is suitable for low level data switching applications. Isolation of 1500 Vac between the field wiring and you computer assure that your computer system is protected even in the harshest electrical environments.

The MEM-8 board uses a single address on the MetraBus. This allows control of up to 64 MEM-8 boards (512 relay pairs) per computer expansion slot. The MEM-8, like other MetraBus output boards, has a data read-back feature allowing the user to verify data integrity. Each relay pair on the MEM-8 also has a visual enunciator LED associated with it permitting easy verification of the relay's state. On power-up or after a MetraBus CLEAR, all relays return to their INACTIVE (NO) state.

Common applications of the MEM-8 include control of pumps and compressors, motor control, energy and HVAC management, alarm activation, temperature (heater/cooler) control as well as numerous other control functions that require high current switching capability.

Detachable screw terminals on the MEM-8 simplify field wiring, and accept standard 12-22 AWG wire sizes. The MEM-8 is compatible with all MetraBus mounting and installation chassis and hardware, making it easy to install the boards in NEMA chassis, in 19-inch racks, on DIN rails, or on any flat surface.

MetraBus programming is very easy. You may write direct register I/O programs, take advantage of the Universal Library or use SoftWIRE, DAS Wizard or any of a wide variety of compatible software packages.

Features

- 8 DPDT relays
- 7 amp contact ratings @ 30 Vdc or 240 Vac
- Detachable screw terminals simplify field wiring
- · Data readback for security
- Power-on & reset into OFF condition
- 1500-Vac isolation
- Up to 512 relays per PC slot
- LED channel status indicators
- Includes powerful *Insta*Cal configuration and test software application.

Specifications

Relay Specifications

Number of relays
Contact configuration
Contact rating (resistive)

8 DPDT (8 pairs of SPDT relays) Dual form C, SPDT per channel 7A @ 30 Vdc, 10A @ 125 Vac, 7A @ 240 Vac

Contact resistance

Isolation

Between contacts
Between coil & contacts

70 milliohms typ.

750 Vac, 50/60 Hz 1500 Vac, 50/60 Hz

Operate time Release time Shock Life expectancy 10 milliseconds max. 5 milliseconds max. 10G (11 milliseconds) 10⁷ min. at rated load

Connectors

Module I/O connector type

Voltage rating Wire sizes

Detachable screw terminal

300 V max. 12-22AWG

Power Consumption

+5 V (all relays off) +5 V (all relays on)

1.1

125 mA typical, 150 mA max. 1.1 A typical, 1.3 A max.

not used

±15 V Environmental

Operating Temperature: Storage Temperature:

0 to 70°C -40 to 100° C

0 to 90% noncondensing

Humidity

Physical Size:

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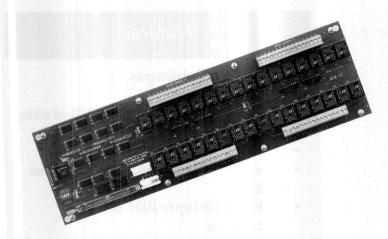
16 x 4.8 inches (40.64 x 12.192 cm)

Ordering Guide

MEM-8 8-point electromechanical relay board for the MetraBus

MEM-32

32-Point Electromechanical Relay Board for the MetraBus



Functional Description

The MEM-32 is a 32-channel, Form A (SPST) electromechanical relay board used with the MetraBus industrial data acquisition and control system. The MEM-32 relays offer 7 amp contact ratings at 30 Vdc and 120 Vac and 5 amp ratings at up to 240 Vac. These high ratings allow the MEM-32 to control all but the largest loads and motor starters. The low 70 milliohm contact ratings also ensure that the MEM-32 is suitable for low-evel data switching applications. Isolation of 1500 Vac between the field wiring and your computer ensure that your computer system is protected even in the harshest electrical environments.

The MEM-32 board uses four consecutive addresses on the MetraBus. This allows a single MetraBus driver board to control up to 16 MEM-32 boards or up to 512 independent relays. The MEM-32 board is divided into four, 8-bit ports. Writing to one of the ports loads data into the output latches and to the relays themselves. Reading data back from a port returns the data currently in the output latch without changing it. This feature allows the user to verify that data on the outputs was received correctly Each relay on the MEM-32 has a visual enunciator LED permitting easy verification of the relay's state. On power-up or after a MetraBus CLEAR, all relays return to their INACTIVE (off) state.

Common applications of the MEM-32 include control of pumps and compressors, motor control, energy and HVAC management, alarm activation, temperature (heater/cooler) control as well as numerous other control functions that require high-current switching capability.

Detachable screw terminals on the MEM-32 simplify field wiring, and accept standard 12-22 AWG wire sizes. The MEM-32 is compatible with all MetraBus mounting and installation chassis and hardware, making it easy to install the boards in NEMA chassis, in 19-inch racks, on DIN rails, or on any flat surface.

MetraBus programming is very easy. You may write direct register I/O programs, take advantage of the Universal Library, or use SoftWIRE, DAS Wizard or any of a wide variety of compatible software packages.

Features

- 32 Form A (SPST) relays
- 7 amp contact ratings @ 30 Vdc or 240 Vac
- Detachable screw terminals simplify field wiring
- · Data readback for security
- Power-on & reset into OFF condition
- 1500 Vac isolation
- Up to 512 relays per PC slot
- · LED channel status indicators
- Includes powerful *Insta*Cal configuration and test software application.

Specifications

Relay Specifications

Number of relays 33

Form A, SPST

Contact Configuration
Contact Rating (resistive)

7A @ 30 Vdc, 10 A @ 125 Vac.

7A @ 240 VAC

Contact Resistance

Isolation

70 milliohms typ.

Between contacts
Between coil & contacts

750 Vac, 50/60 Hz 1500 Vac, 50/60 Hz

Operate Time Release Time Shock 10 milliseconds max. 5 milliseconds max. 10G (11 milliseconds)

Life Expectancy

10⁷ min. at rated load

Connectors

Module I/O Connector type

Detachable screw terminal

Voltage Rating Wire sizes 300 V max. 12-22AWG

Power Consumption

+5V (all relays off) +5V (all relays on) 350 mA typical, 425 mA max. 2.10 A typical, 2.45 A max.

±15 V

not used

Environmental

Operating Temperature: Storage Temperature:

0 to 70°C -40 to 100° C

Humidity

0 to 90% non-condensing

Physical Size:

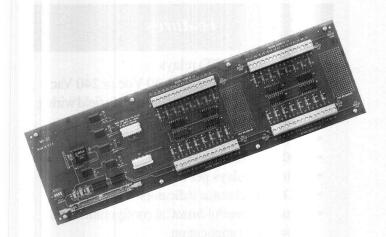
16 x 4.8 inches (40.64 x 12.192 cm)

Ordering Guide

MEM-32 32-point electromechanical relay board for the MetraBus

MII-32

32-Bit Isolated Digital Input Board for the MetraBus



Functional Description

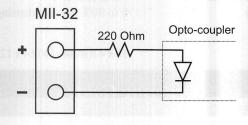
The MII-32 is a 32-channel isolated digital input board. The board is compatible with TTL and buffered CMOS logic families. The inputs may also be used to monitor contacts/switch systems with ON voltages up to 11 Vdc. Provisions are included for monitoring higher input voltages using customer-modifiable resistors. Using this board, the MetraBus system can read up to 512 digital input channels from a single computer expansion slot.

The MII-32 board uses four consecutive addresses on the MetraBus. This allows a single MetraBus driver board to monitor up to 16 MEM-32 boards or up to 512 inputs. The MII-32 board is divided into four, 8-bit ports.

Common applications of the MII-32 include monitoring of relay contact status, alarm status, limit switches, as well as acquiring data from a wide variety of electrical equipment with logic level outputs.

Detachable screw terminals on the MII-32 simplify field wiring, and accept standard 12-22 AWG wire sizes. The MII-32 is compatible with all MetraBus mounting and installation chassis and hardware, making it easy to install the boards in NEMA chassis, in 19-inch racks, on DIN rails, or on any flat surface.

MetraBus programming is very easy. You may write direct register I/O programs, take advantage of the Universal Library, or use SoftWIRE, DAS Wizard, or any of a wide variety of compatible software packages.



MII-32 Input Configuration

Features

- 32 Logic level digital inputs
- 500 Vac isolation
- · Detachable screw terminals simplify field wiring
- Low Cost
- Monitors up to 512 inputs per PC slot
- On-board locations for adding custom signal conditioning
- Can be installed up to 100 feet from host computer

Specifications

Di	oita	In	puts
M.P.B	Sen y garage	AAA A	horen

Number of input channels
Input configuration

32 in 4 banks of 8

Optocoupler in series with 220 ohm resistor

Input high threshold voltage Input low threshold voltage Input high threshold current Input low threshold current

1.3 Vdc max. 3.2 mA, min. 0.25 mA max.

2.2 Vdc min.

Input voltage Reverse voltage Forward current Forward voltage 11 Vdc max. 6V max. 60 mA max. 1.25 V typ.

Surge current Isolation resistance 2.5 A max. 10^{12} ohms (V = 500V, Ta = 25°C)

Isolation voltage

500 Vdc typ.

Connectors

Module I/O connector type

Detachable screw terminal

Voltage rating Wire sizes

300 V max. 12-22 AWG

Power Consumption

+5 V ±15 V 220 mA typical, 300 mA max.

not used

Environmental

Operating temperature:

0 to 70 °C -40 to 100 ° C

Storage temperature: Humidity

0 to 90% noncondensing

Physical

Size:

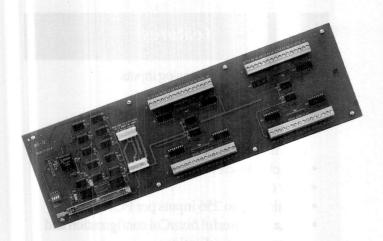
16 x 4.8 inches (40.64 x 12.192 cm)

Ordering Guide

MII-32 32-Bit isolated digital input board for the MetraBus

MIO-32

32-Bit Isolated Digital Output Board for the MetraBus



Functional Description

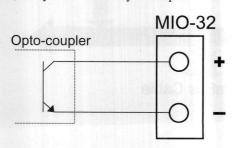
The MIO-32 is a 32-channel isolated digital output board. With output drive currents up to 50 mA, supplies enough drive current to directly control solid state I/O modules and many types of relay. The MIO-32 is also compatible with standard CMOS/TTL logic.

The MIO-32 board uses four consecutive addresses on the MetraBus. This allows a single MetraBus driver board to control up to 16 MEM-32 boards or up to 512 outputs. The board is divided into four, 8-bit ports. Writing to one of the ports loads data into the outputs. Reading data back from a port returns the data currently in the output latch without changing it. This feature allows the user to verify that data on the outputs was received correctly

Common applications of the MIO-32 include controlling alarm annunciators, relays, solid-state I/O modules as well as writing digital data to a wide variety of external electronic systems.

Detachable screw terminals on the MIO-32 simplify field wiring, and accept standard 12-22 AWG wire sizes. The MIO-32 is compatible with all MetraBus mounting and installation chassis and hardware, making it easy to install the boards in NEMA chassis, in 19-inch racks, on DIN rails, or on any flat surface.

MetraBus programming is very easy. You may write direct register I/O programs, take advantage of the Universal Library, or use SoftWIRE, DAS Wizard, or any of a wide variety of compatible software packages.



MIO-32 Output Configuration

Features

- 32 Logic level, open collector digital outputs
- 500 Vac isolation
- Detachable screw terminals simplify field wiring
- Low Cost
- Controls up to 512 outputs per PC slot
- Can be installed up to 100 feet from host computer
- Includes powerful *Insta*Cal configuration and test software application.

Specifications

Digital Outputs

Number of outputs 32 in 4 banks of 8 Output configuration Open collector

Output device type ILQ2X009 quad optocoupler

Collector current (On) 50 mA max. Collector current (Off) 1 µA maximum

Collector - emitter specifications

Output voltage 20 V max.

Saturation Voltage 0.25 V typ., 0.4V max.

(Ice = 1 mA, Ib = $20\mu\text{A}$)

70 V max. Reverse voltage

Isolation resistance 10^{12} ohms (V = 500V, Ta = 25°C)

Isolation voltage 500 Vdc continuous

Connectors

Module I/O connector type Detachable screw terminal

Voltage rating 300 V max. Wire sizes 12-22 AWG

Power Consumption

+5 V (all 4 banks at all zero's) 290 mA typical, 350 mA max. +5 V (all 4 banks at all one's) 630 mA typical, 700 mA max.

±15 V

not used

Environmental

Operating temperature: 0 to 70°C Storage temperature: -40 to 100° C

Humidity 0 to 90% noncondensing

Physical

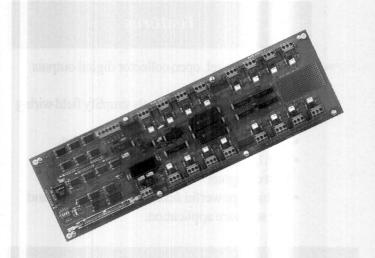
Size: 16 x 4.8 inches (40.64 x 12.192 cm)

Ordering Guide

32-Bit isolated digital output board for the MetraBus

MAI-16

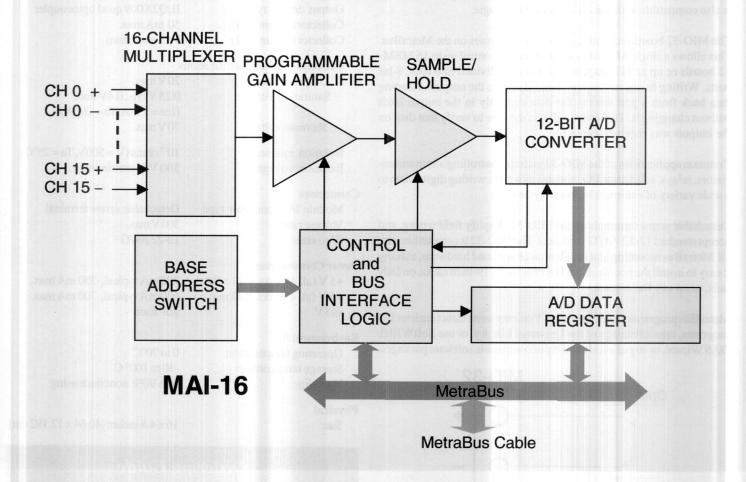
16-Channel, 12-Bit Analog Input Board for the MetraBus



Features

- 16 fully differential analog inputs
- 12-bit resolution
- 4 voltage input ranges or 0 20 mA
- On-board precision 10 V reference for external circuitry excitation
- Detachable screw terminals simplify field wiring
- · Low cost
- Monitor up to 256 inputs per PC slot
- Includes powerful *Insta*Cal configuration and test software application.
- Can be installed up to 100 feet from host computer

Block Diagram



The board has provisions for an assortment of user-installed resistors. Installation of these resistors allows the user to customize the analog inputs with a wide variety of voltage divider and filter configurations, as well as configure the input for use with common, or isolated ground input sources.

The MAI-16 board uses four consecutive addresses on the MetraBus. This allows a single MetraBus driver board to control up to 16 MAI-16 boards or up to 256 inputs.

Common applications of the MAI-16 include large scale temperature monitoring and control, factory floor automation as well as numerous HVAC and automated test applications.

Detachable screw terminals on the MAI-16 simplify field wiring, and accept standard 12-22 AWG wire sizes. The MAI-16 is compatible with all MetraBus mounting and installation chassis and hardware, making it easy to install the boards in NEMA chassis, in 19-inch racks, on DIN rails, or on any flat surface.

MetraBus programming is very easy. You may write direct register I/O programs, take advantage of the Universal Library, or use SoftWIRE, DAS Wizard, or any of a wide variety of compatible software packages.

CMRR @ 60 Hz 70 dB Input leakage current 200 nA

Input impedance 10 megohms min

Maximum input voltage ±35 V

Reference Output

Reference voltage +10.0 Vdc ±0.1 V Reference current 10 mA maximum

Power Consumption

+5 V 180 mA typical, 225 mA max. +15 V 33 mA typical, 40 mA max -15 V 40 mA typical, 47 mA max

Environmental

Operating temperature: 0 to 70°C Storage temperature: -40 to 100° C

Humidity 0 to 90% noncondensing

Physical

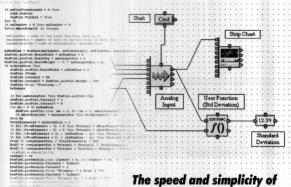
Size: 16 x 4.8 inches (40.64 x 12.192 cm)

Ordering Guide

MAI-16 16-channel analog input board for the MetraBus



The power and flexibility of syntactical programming



graphical programming

Introducing SoftWIRE™

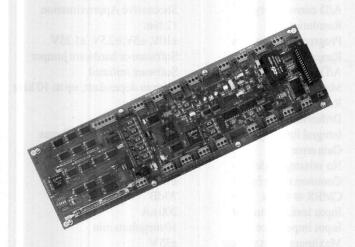
Graphical Programming in Visual Basic®

Syntactical programming has been around since the early days of computers. More recently, graphical programming languages have been introduced and are now a popular alternative to writing hard core, text-based syntax. What's been lacking is an easy way to combine the speed and ease of use of graphical programming with the flexibility and efficiency of writing code in an industry-standard language. Until now—Introducing SoftWIRE.

For more information on SoftWIRE, please see pages 6 -10 in this catalog.

MAI-TC

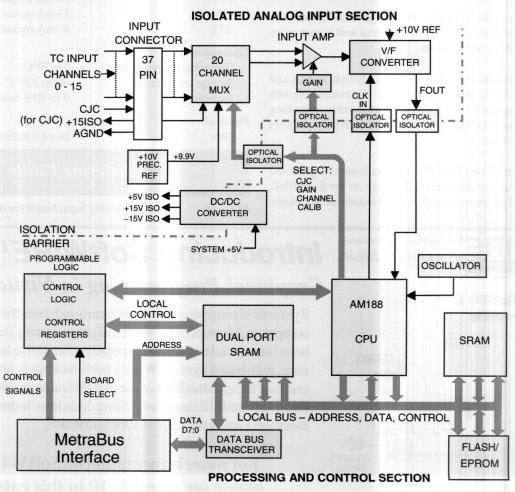
16-Channel, Thermocouple Input Board for the MetraBus



Features

- Reads TC types J, K, E, T, R, S and B
- On-board processor performs conversions to temperature
- 16 fully differential analog inputs
- Resolution as high as 0.03 °C
- Detachable screw terminals simplify field wiring
- Auto-calibrating
- Monitor up to 256 thermocouples per PC slot
- 500-volt isolation between thermocouples and MetraBus cable
- Can be installed up to 100 feet from host computer

Block Diagram



Functional Description

The MAI-TC is a 16-channel thermocouple input board for use with the MetraBus. An on-board microprocessor performs all system control as well as converting the raw analog input data into temperature. The board is based an a highly accurate and noise immune V/F based analog-to-digital converter.

The analog input section consists of a 16-channel input multiplexer, a CJC input, a programmable-gain amplifier, and a high-frequency V/F based A/D converter. Input sample rates may be set to frequencies of 50 Hz, 60 Hz, or 400 Hz. To minimize input noise, match the sample rate frequency to the frequency of the high-voltage power supplied in your area. This will take advantage of the A/D's integrating nature and remove much of the error caused by ambient electronic noise. Note that a lower sample rate produces higher resolution and an improved signal-to-noise ratio.

During each scan the A/D converter samples each of the thermocouple inputs, measures the CJC input, measures the input gain using the precision reference voltage, and measures the input offset voltage. The processor then takes the raw input data adjusts it based on

Input leakage current

±80 nA max

calibration and CJC factors and converts the data into temperatures. The processor then places the data into the on-board FIFO, ready to be read by the MetraBus.

The MAI-TC board uses four consecutive addresses on the MetraBus. This allows a single MetraBus driver board to monitor up to 16 MAI-TC boards or up to 256 thermocouple inputs. The MAI-TC is an ideal solution in a wide array of industrial and large-scale temperature monitoring applications.

Detachable screw terminals on the MAI-TC simplify field wiring, and accept standard 12-22 AWG wire sizes. The MAI-TC is compatible with all MetraBus mounting and installation chassis and hardware, making it easy to install the boards in NEMA chassis, in 19-inch racks, on DIN rails, or on any flat surface.

MetraBus programming is very easy. You may write direct register I/O programs, take advantage of the Universal Library, or use SoftWIRE, DAS Wizard, or any of a wide variety of compatible software packages.

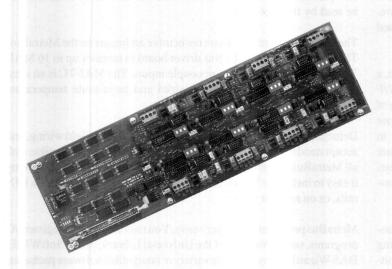
Specifications

Analog Inputs			Input impedance	100 megohms min
Number of channels		16 differential	Absolute maximum input	-40V to +55V
A/D converte	r type	AD652 V/F Converter	Isolation to MetraBus cable	500V min
A/D pacing		Continuous, programmable for	Miscellaneous	Averaging - Moving average, 1
		50 Hz, 60 Hz, or 400 Hz;		to 16 samples, software-
Accuracy & Res	olution			selectable
TC Type	Range	Accuracy	Calibration -	each channel scan removes
J	0 to 750°C	±0.5 °C		offset and gain error; also CJC
K	-200 to 1250°C	±1.4°C		each time.
Е	-200 to 900°C	±1.1 °C	Processor reset -	On power-up, watchdog
T	-270 to 350°C	±0.9 °C		time-out, or s/w command.
R	0 to 1450°C	±2.3 °C	Temperature units -	Programmable for conversion
S	0 to 1450°C	±2.3 °C		to degrees C or degrees F
В	0 to 1700°C	±3.0°C	Crystal oscillator	32 MHz; accuracy 100ppm
Resolution:	@ 50Hz	@ 60Hz	Power Consumption	
0.05 °C	0.05 °C	0.40 °C	+5 V	400 mA typical, 600 mA max.
0.05 °C	0.05 °C	0.40 °C	+15 V	20 mA typical, 30 mA max
0.03 °C	0.04°C	0.25 °C	-15 V	25 mA typical, 35 mA max
0.03 °C	0.04°C	0.25 °C	Environmental	
0.06°C	0.07 °C	0.44°C		04-7000
0.06°C	0.08 °C	0.52 °C	Operating Temperature:	0 to 70°C
0.07 °C	0.08 °C	0.54 °C	Storage Temperature: Humidity	-40 to 100° C
			rumdity	0 to 90% noncondensing
Data transfer		Single I/O register transfer	Physical	
		through Dual Port RAM	Size:	16 x 4.8 inches (40.64 x 12.192 cm)
Linearity error		±0.05% @ 4 MHz fclock		
Gain drift (A/I		±75 ppm/°C max		
Zero drift (A/I		±50uV/°C max	A STATE OF THE PARTY OF THE PAR	
Overvoltage Protection		-40 to +55V	Orderi	ng Guide
CMRR @ 60H	Z	80dB min	HALLS BOOK BUILDING THE	

16 Channel thermocouple input board for the MetraBus

MA0-12

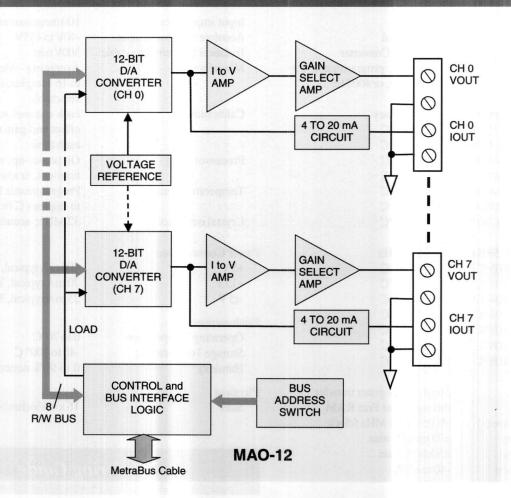
8-Channel, 12-Bit Analog Output Board for the MetraBus



Features

- 8 analog outputs
- 12-bit resolution
- 4 Voltage output ranges or 0 20 mA
- Detachable screw terminals simplify field wiring
- Low cost
- Monitor up to 64 outputs per PC slot
- Can be installed up to 100 feet from host computer
- Includes powerful *Insta*Cal configuration and test software application.

Block Diagram



Functional Description

The MAO-12 is an 8-channel, 12-bit resolution analog output board for the MetraBus. The outputs provide four voltage ranges and 4-20 mA outputs. Output ranges are set by a DIP switch on the board. The table below shows the available output ranges with their corresponding resolutions in millivolts or milliamps.

Output	
Range	Resolution
0-10V	2.44 mV
0-5 V	1.22 mV
±10V	4.88 mV
±5 V	2.44 mV
4-20mA	3.91 µA

In voltage output mode, the MAO-12 can sink or source up to 5 mA at rated accuracies. The 4-20 mA mode offers a wide 8 V to 36 V output compliance range at rated accuracy. The outputs may be programmed to update as they are written, or any of the outputs may be set to update simultaneously. All outputs are reset to 0 volts upon power-up or MetraBus clear.

The MAO-12 board uses eight consecutive addresses on the MetraBus. This allows a single MetraBus driver board to control up to 8 MAO-12 boards or up to 64 analog outputs. Common applications of the MAO-12 include large-scale process control and automated test applications.

Detachable screw terminals on the MAO-12 simplify field wiring, and accept standard 12-22 AWG wire sizes. The MAI-16 is compatible with all MetraBus mounting and installation chassis and hardware, making it easy to install the boards in NEMA chassis, in 19-inch racks, on DIN rails, or on any flat surface.

MetraBus programming is very easy. You may write direct register I/O programs, take advantage of the Universal Library, or use SoftWIRE, DAS Wizard, or any of a wide variety of compatible software packages.

Specifications

Analog output section

8 Outputs 12 bits Resolution

±10, ±5, 0-10, 0-5V, & 4-20 mA Output ranges

Output current ±5 mA

Short circuit current ±25 mA, indefinitely

Output impedance $0.1\,\mathrm{ohm}$

Output settling time 10 μS max (FS step to 1/2 LSB)

Output slew rate 7 V/uS

On-board dip switch Range selection Software driven Output pacing

System dependant, up to 10 kHz Maximum sample rate

Offset error $\pm 600 \mu V$

Monotinicity 12 bits, guaranteed

Relative accuracy ±1.5LSB Differential linearity error ±0.75 LSB

Integral linearity error ± 0.5 LSB typ, ± 1.5 LSB max

Power Consumption

400 mA typical, 520 mA max. +5V +15 V 24 mA typical, 28 mA max -15 V 52 mA typical, 60 mA max

Environmental

Operating temperature: 0 to 70 °C Storage temperature: -40 to 100 ° C

Humidity 0 to 90% noncondensing

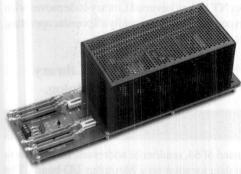
Physical

Size: 16 x 4.8 inches (40.64 x 12.192 cm)

Ordering Guide

MAO-12 8-Channel analog output board for the MetraBus

MBUS-PWR 100 Watt, Power Supply for the MetraBus



Features

- Provides 100 Watts of power to MetraBus I/O Boards
- Wide input ranges 90-132 VAC or 180-264 VAC
- Short circuit protected

Functional Description

The MBUS-PWR is required to provide power to MetraBus I/O boards whenever the system usage exceeds 1A at +5 Vdc, or whenever ±15 volt power is required (for analog I/O boards). The MBUS-PWR provides up to 100 watts to your system. This power may be distributed to the I/O boards via the MetraBus cable or via the C-POWER-10 series that uses standard 4-pin PC power type connectors. The board provides multiple connections, allowing the user maximum flexibility in placing the power supply anywhere in the system as well as minimizing the current in any one cable.

The MBUS-PWR is fully compatible with all MetraBus I/O mounting chassis and hardware, and is compliant with IEC, LTL, CSA and VDE safety requirements.

Specifications

General

Efficiency 65% min@ 100 W Line regulation ±0.5% max at full load

Input

Voltage 90 to 132 Vac or

180 to 264 Vac Frequency 47 to 440 Hz

Current 3.2 A (rms) @ 115 Vac 1.8 A (rms) @ 230 Vac

Output

+5 Vdc 10 A, max. +15 Vdc 4 A. max. -15 Vdc 1 A, max.

Ripple/noise 1% peak to peak, max

Order

MBUS-PWR MetraBus Power Supply

MetraBus Software

Programming options for the MetraBus

Fully Configured Application Packages

The MetraBus is supported by an extremely wide assortment of application software. These include:

- SoftWIRE, our new graphical programming add-in for Visual Basic
- DAS Wizard, our popular Excel addin that allows you to monitor and control your MetraBus system from within Excel.
- HP VEE and HP VEE Lab, Agilent Technologies® popular graphical programming environments
- LabVIEWTM, through the use of our Universal Library for LabVIEW driver.



Introducing SoftWIRE™

Graphical Programming
in Visual Basic®

Syntactical programming has been around since the early days of computers. More recently, graphical programming languages have been introduced and are now a popular alternative to writing hard core, text-based syntax. What's been lacking is an easy way to combine the speed and ease of use of graphical programming with the flexibility and efficiency of writing code in an industry standard language. Until now—Introducing SoftWIRE.

For more information on SoftWIRE, please see pages 6 -10 in this catalog.

Language Based Programming Utilizing the Universal Library

ComputerBoards' Universal Library is a powerful and easy-to-use software library. Using the library greatly simplifies the process of writing programs for MetraBus applications.

Universal Library is easy to use. It is written from the programmer's perspective. Simple data acquisition operations, such as making an analog reading, or a series of them, are treated as a single operation.

Universal Library is easy to maintain. The syntax is constant from board to board, and to a great extent from language to language. It is easy to use the same code with different boards and different platforms.

Universal Library is easy to expand. The personal computer is evolving constantly. Today the exciting news is PCI, CompactPCI, Windows 2000, and many other new developments. Here is some good news. The Universal Library lines of code you write today will run on the newest platforms and support our newest boards in the future, without modification! Universal Library was designed to protect your investment in software.

Universal means Easy to Learn & Use

Universal means board to board the syntax for functions, such as an analog input, are the same. From MAI-16 to PCI-DAS1602/16 the programming syntax is the same. In addition, the Universal Library is intelligent. It knows about individual boards and their capabilities. Ask for something the board can't do, and a warning message supplies the information you need to correct the program.

Universal means language to language the syntax structure remains constant. The functions and features remain constant. The intelligent capability parser remains constant. Want to change programming languages? The Universal Library requires no relearning. Moving from Windows 95 to Windows NT? The Universal Library code moves with you. Universal Library is compatible with virtually all popular operating systems and programming languages.

For more information on the Universal Library, please refer to pages 25-27 in this catalog.

Direct Register Programming

Most users will take advantage of ComputerBoards' power Universal Library (UL) software to handle the bulk of the programming task. However, it is also very straightforward to program at the register level. Though the MetraBus is very easy to program, we recommend register level programming to experienced programmers only.

Register programming is accomplished with simple I/O writes and reads to the MetraBus driver board. MetraBus register level programming is quite simple, since the MDB-64 driver board provides all required low-level timing and control signals.

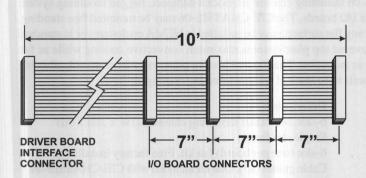
The MetraBus is composed of 64, read/write addresses. Each address points to a unique 8-bit data location on a MetraBus I/O board. The MDB-64 series utilizes 3 PC I/O registers in your computer's I/O register space. These are referred to as the *Base Address*, *Base Address* +1, and *Base Address* +2.

To read or write to a MetraBus I/O board, simply write the desired MetraBus address to the MDB-64 *Base Address*, and then read or write the MetraBus data to the MDB-64 *Base Address* +1. The MetraBus manual provides a detailed description of this process and will be easily followed by a reasonably experienced programmer.

MetraBus Accessories

Cables, Enclosures and Mounting Options for the MetraBus

MetraBus Cables



The Standard M-10-4-7 cable

The MetraBus cable connects all MetraBus I/O boards to the MDB64 driver board. In addition to providing the signal interface, the MetraBus cable may also be used to distribute power to the MetraBus I/O boards. The current carrying capability of the 50-pin ribbon cable is 10 amps at +5V, 1 amp at +15V and 1 amp at -15V. If your power requirements are higher than that supported by the ribbon cable, use the C-POWER-10 power cable for additional power distribution.

Specify your MetraBus using the M-XX-YY-ZZ part number conventions, where XX is the total cable length in feet, YY is the number of I/O connectors installed, and ZZ is the I/O connector spacing in inches. Order custom cables using this numbering, or provide a sketch with your order.

MetraBus Cables

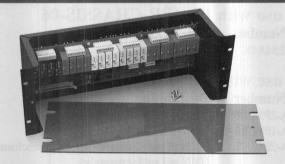
M-10-4-7 Standard MetraBus Cable
M-XX-ZZ-YY Custom MetraBus Cable

C-POWER-XX Optional Power Distribution Cable. Three versions

available -8, -12 and -36 where the number designates

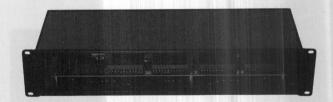
the cable length in inches

19 Inch Rack Enclosures



ENC-19X5X7

MetraBus systems are easily installed in 19-inch rackmount configurations using the ENC-19X5X7 enclosure. The ENC-19X5X7 mounts the MetraBus I/O board vertically and provides easy access for field wiring as well as the MetraBus cable.



ENC-19X7X3

MetraBus systems are easily installed in 19 inch rackmount configurations using the ENC-19X7X3 enclosure. The ENC-19X7X3 mounts the MetraBus I/O board horizontally and provides maximum mounting density in your rack while still allowing easy access for field wiring and the MetraBus cable.

19 Inch Racks



Enclosed Table Top Racks

ERTT-14 19" table top rack, 14" rack space, suitable for two 5.25" enclosures ERTT-23 19" table top rack, 22.75" rack space, suitable for three 5.25" enclosures

Free Standing Racks (not shown)

RR-1249 31" (28" panel space) table top rack mount

RR-1364 76" (71.75" panel space) floor mounted rack mount

RC-7758 Wheels for RR-1364MG

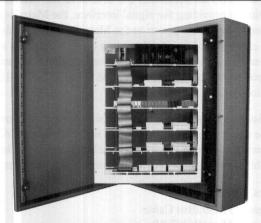
Blank 19" Rack Faceplates

BLK-35G 3.5" blank rack panel, Gray BLK-55G 5.5" blank rack panel, Gray BLK-55B 5.5" blank rack panel, Black 5.5" blank rack panel, Black

MetraBus Accessories

Cables, Enclosures and Mounting Options for the MetraBus

ComputerBoards Industrial Enclosure (CIE) Chassis



The CIE-CHASSIS-06 shown mounted in the (optional) CIE-NEMA4X enclosure

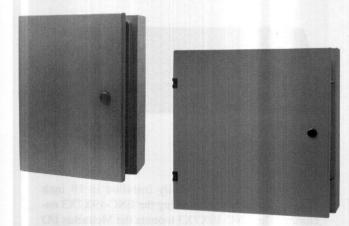
The CIE-CHASSIS-06 mounting chassis provides a compact, rugged mounting system for up to 6 MetraBus I/O boards. The CIE-CHASSIS-06 may be mounted free standing, attached to a wall or any flat surface, may be installed in NEMA enclosures or in standard 24 inch racks. A louvered top plate ensures maximum convective cooling while ac fan cooling is available as an option. The top and bottom plates may be removed, allowing CIE-CHASSIS-06 units to be stacked without affecting cooling air flow.

Part Number	Description
CIE-CHASSIS-06	6-slot, MetraBus mounting chassis (21w x 28h x 5d)*
CIE-FAN-01	Single slot fan kit
CIE-FAN-06	6-slot (one per board) fan kit. Free factory installation
CIE-CGUIDE-15	Cable guides (15). One kit included with CIE-CHASSIS-06
CIE-EIA-MOUNT06	Hinged mounting kit for 24-inch rack installations
CIE-NEMA-MOUNT06	Hinged mounting kit for CIE-NEMA4X enclosure

*all dimensions shown in inches

For further information on the CIE-CHASSIS series, please visit our web site and click on Mounting Racks & Accessories in the MetraBus section.

NEMA Enclosures



For use with the CIE-CHASSIS-06

Part Number Description*

CIE-NEMA4X NEMA4, 30 x 36 x 8 enclosure

For use with DIN Rail Kits

Part Number Description*

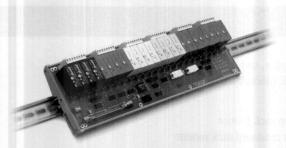
NEMA-2P20206 NEMA4, 20x20x6 enclosure NEMA-18P1717 Inner panel for 20x20x6 enclosure

NEMA-2DMK20 DIN rail installation kit for 20x20 enclosures

(DIN rail sold separately)

NEMA-2ZPMF External mounting feet for NEMA enclosures

DIN Rail Mounting Kits



MSSR-24 board shown mounted in DIN-16X4.8 DIN Rail Kit

DIN-16X4.8

MetraBus I/O boards are easily mounted on standard TS35 x 7.5 DIN rail with the optional DIN-16X4.8 DIN Rail mounting kit.

Steel DIN Rail (TS35 x 7.5 standard)

DIN-RAIL-10 10" standard T35 x 7.5, slotted DIN rail DIN-RAIL-17 17" standard T35 x 7.5, slotted DIN rail DIN-RAIL-18 18" standard T35 x 7.5, slotted DIN rail DIN-RAIL-39 39" standard T35 x 7.5, slotted DIN rail

^{*} all dimensions shown in inches

IQ Series Data Loggers



	IQ Series Data Loggers		Page
NEW!	IQ Series Overview	Introducing the IQ-Series Data Logger Family	238
NEW!	IQ-Temp	Ambient Temperature Logger	240
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IQ-Data Logger Family

The IQ Advantage

IQ Family Features

- Easy to use
- Rugged, impact resistant plastic case
- Wide variety of loggers to match your requirements
- Long battery life (up to 10 years)
- Small size
- High resolution (12 bits)
- Large sample sizes (up to 43,120 samples)
- Low cost



Functional Description

The IQ Family is a line of high-quality, self-contained, stand-alone data loggers for recording temperature, humidity, dc volts, milliamps, or events. The IQ is packaged in a small, extremely rugged case and is very easy to operate.

If you need to gather temperature/humidity data or record signals from remote measurement devices, an IQ Data Logger can do the job, any time, and nearly any place.

IQ data loggers are simple to operate. Simply plug the logger into a serial port on your PC. Next, use the IQ-Wizard software to select the sample rate, thresholds, and start method. Then, unplug the logger, deploy it where desired, and start recording data. If desired, recording can be programmed to start at a later time and/or date. After the recording session is over, simply retrieve the logger, reconnect it, and download the data to an Excel spreadsheet. From there, take advantage of all the powerful features of Excel, or simply save the data to disk for further reference.

The basic IQ Logger typically holds up to 21,280 samples, while the -40 version Loggers can hold up to 43,120 samples. With 43,120 samples you can sample once a minute for 30 days, or once every 15 minutes for over 14 months! Note that if you aren't logging ambient temperature, these numbers increase by almost 50%.

For continuous operations, you may download data from your IQ Logger's memory without interrupting the ongoing logging procedure. You can also leave the IQ connected to your PC indefinitely and log your data in real-time, directly to disk.

If you lose power or your computer stops running, your data will still be available in the IQ Logger's internal memory. All data is stored in nonvolatile memory, so even in the unlikely event that your battery dies, your data is safe and will be available when you install a new battery or connect the logger to your PC. Battery life of up to ten years makes maintenance virtually a non-issue.

IQ Operating Modes

IQ data loggers have two primary modes of operation:

- Periodically recording data after being started, or
- Recording a single sample of data when the key on the logger is pressed.

In periodic recording, a sample period of from 0.125 sec to 24 hours is programmed into the logger. Data sampling can be started in three modes: Immediately upon configuring the logger; by pressing the logger's key (pushbutton); or on a specific time and date based on the internal real-time clock & calendar.

Once started, the logger will record data until stopped by pressing the logger key, or, if programmed, when the memory is full. If not programmed to stop on full memory, the logger will continue to record data, overwriting the oldest data, until manually stopped.

All IQ Data Loggers may also be configured to operate in a single-sample mode. In this mode, no recording is done until the logger's "key" (pushbutton) is pressed and held for one second. When this is done, a single, time/date-stamped sample is recorded. This process may be continued until the logger's memory is full.

Each sample can consist of one or two channels of data plus the time-stamp. The channel data recorded varies with the IQ Logger model and the desired configuration. With the IQ-Event, time-stamping may also be employed without any other data being recorded, such as logging the times that random events occur.

All IQ Data Loggers have an LED status/alarm indicator. The LED indicates status or alarm as follows:

- Single blink every 5 sec. = sampling
- Single blink every 1 sec. = sampling, threshold exceeded
- Double blink every 5 sec.= waiting for start by keypress, pre-set time, or single sample mode
- Double blink every sec. = sampling stopped

Common Specifications

Size 3.1 x 2.5 x 1.0 inches (79 x 64 x 25mm)

Weight 2.8 ounces (80g)

Battery

Heavy-duty ABS with 0.23" Case

attachment hole for cable or padlock.

Via the attachment hole, or use a Mounting

magnetic or velcro mounting

strips included with each logger

(1) 3.6 V lithium AA

Battery life Up to ten-years depending on

sample rate.

Memory 31,920 bytes (standard models)

64.680 bytes ("-40" models)

3990 to 64,680 samples Data Size

Resolution 12-bit (0.0244%) Sample periods 0.125 sec to 24 hours

Ambient temp, sensor IC, -40 to 85 °C (-40 to 185°F) Start button, status/alarm LED Front panel Sensor connector Removable screw terminals

(none on Temp and TRH models)

OEM Support

If your application requires modification of the standard IQ family design or specifications, please contact us. We can produce data loggers in the form factor, memory configuration and sensor suite that you need, all at a reasonable price and with quick delivery. Please call us to discuss your OEM application!

You can integrate an IQ Logger into your own software application. An IQ Logger uses simple ASCII strings to communicate with the host PC during setup and data download. If you would like to integrate IQ Loggers into your own software we'll give you everything you need to know.

PC Interface Kit and Accessories

To interface your IQ data loggers to your computer, you will need an IQ-PCIK, PC Interface Kit that is sold separately. The interface kit includes the serial cable/adapter and IQ-Wizard software. One PC Interface Kit can be used with any number of data loggers, so you need only one interface kit.

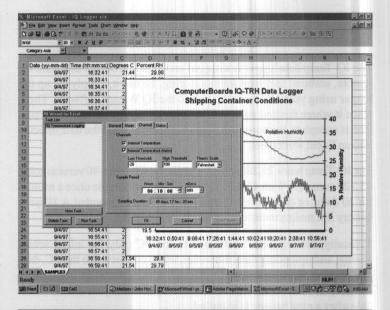
Please refer to this catalog or visit our web site for details on these signal conditioning products. Or, simply call us and ask to speak with one of our measurement specialists. We'd like to talk with you!



Software

IO-Wizard is an add-in for Microsoft's Excel. It enables you to set up and read out any IQ data logger. A simple dialog box is used to configure the data logger prior to deployment. After a data recording session, and upon retrieving the IQ Logger, you simply set the range of cells in an Excel worksheet where the data will be placed. IQ-Wizard then places your data directly into the cells of the worksheet. By using the powerful analysis, charting, and programming features of Excel, you not only get the information you need quickly, but you can also automate the data reduction process for future IO Logger downloads. Data is stored and displayed in the engineering units, whether temperature (°C, °F, or K), relative humidity (%), V, mv, mA, A, or counts.

IQ Wizard requires Windows 95/98/NT and Excel 97. IQ Wizard is sold as part of the IO-PCIK, PC Interface Kit.



Current Model Data Loggers

IQ-Temp	Ambient Temperature Logger	
IQ-Temp-40*	Ambient Temperature Logger	
IQ-TC	Thermocouple + Ambient Temperature	
IQ-TC-40*	Thermocouple + Ambient Temperature	
IQ-TRH	Relative Humidity + Ambient Temperature	
IQ-TRH-40*	Relative Humidity + Ambient Temperature	
IQ-TempXT	Probe-Based Temp. + Ambient Temperature	
IQ-TempXT-40*	* Probe-Based Temp. + Ambient Temperature	
IQ-VmA	Volts/milliAmp + Ambient Temperature	
IQ-VmA-40*	Volts/milliAmp + Ambient Temperature	
IQ-Event	Event/Time-Stamp and Amb. Temperature	
IQ-Event-40*	Event/Time-Stamp and Amb. Temperature	
IQ-PCIK	IQ family PC Interface Kit	

^{*}A standard IQ Logger stores up to 21,280 samples; a "-40" version can store up to 43,120 samples.

IQ-Temp, IQ-Temp-40

Ambient Temperature Data Logger



Functional Description

The IQ-Temp data logger is a rugged and versatile device designed for remote, ambient temperature monitoring. To use it, simply set up the logger using your PC's serial port and the IQ Wizard software. Then, place it where desired and start the logger. When your recording session is complete, reconnect to your PC and download the data directly into an Excel worksheet.

The IQ-Temp holds 21,280 samples while the IQ-Temp-40 version holds 43,120 samples. With 43,120 samples, you can sample once a minute for 30 days, or once every 15 minutes for over 14 months! A 10-year battery life makes maintenance a virtual non-issue.

Typically, the logger is connected to the PC only for initial setup, testing, and uploading data. However, while connected to the PC, data can also be displayed in real time. All data is stored in nonvolatile memory so in the unlikely event of battery failure, your data is available after a new battery is installed.

Sampling can be started:

- Immediately after configuration,
- by pressing the start button after deployment,
- at a programmed time and date,
- by pressing the start button to acquire a single sample

Sampling can be programmed to stop when the memory is full, or by pressing the logger button. If not programmed to stop on a full memory, the logger will continue to acquire samples and will overwrite the oldest stored data.

A Status/Alarm LED on the logger indicates status as follows:

- Single blink every 5 sec. = sampling
- Single blink every sec. = sampling, temperature

threshold exceeded

- Double blink every 5 sec. = waiting for start
- Double blink every sec. = sampling stopped

You will need an IQ-PCIK PC Interface Kit to communicate with your IQ logger. The kit includes IQ-Wizard software and a serial cable/ adapter. The kit is sold separately and can be used with any number of data loggers.

Features

- Acquires up to 43,120 temperature samples (IQ-Temp-40)
- Periodic sampling or manual, (single) time-stamped samples
- · Fast and easy setup, data-downloads and analysis with IQ WizardTM and ExcelTM.
- Rugged ABS plastic construction
- 12-bit resolution
- User-replaceable lithium battery lasts up to 10 years
- Conversion to °C (default), °F, or K.
- Serial connect to PC to upload and/or view data in real time.
- Four start-sampling modes (Immediate, key, time, single sample)

Performance & Specifications

Data Logging

Memory type

Type: Ambient temperature A/D resolution 12 bits

Sampling rates 8 Hz to 1 per 24 hours Clock accuracy ±2 seconds per day

Data transfer To on-board memory, optional real-

> time viewing of data nonvolatile

IQ-TEMP Maximum sample sizes **IQ-TEMP-40** Single, time-stamped samples 4,560 9,240 Periodic sampling 21,280 43,120

Internal Temperature Sensor

Semiconductor

-40 to 85°C (-40 to 185°F) Range

Resolution 0.03°C

Relative accuracy ±0.5°C over entire range

Response time: 10 minutes in still air (to 63%)

General

Size 3.1 x 2.5 x 1.0 in. (79 x 64 x 25mm)

Weight 2.8 ounces (80g)

Case Heavy duty ABS plastic

Front panel Start/stop button, status/alarm LED

Power Consumption

Battery 3.6 V lithium, 2.1 AH

Battery life Sample Period **Battery Life** 0.125 second 2.3 years 1.0 second 6.9 years

> >13 seconds 10 years

Environmental

Operating/storage temp. -40 to 85°C (-40 to 185°F)

Humidity 0 to 95% noncondensing

Ordering Guide

IQ-Temp Ambient Temperature Logger - 21K Samples

IQ-Temp-40 Ambient Temperature Logger - 43K Samples

IQ-PCIK IQ family PC Interface Kit

IQ-TRH, IQ-TRH-40

Relative Humidity and Ambient Temperature Data Logger



Functional Description

The IQ-TRH data logger is a rugged and versatile device designed for remote, battery-operated monitoring. The unit measures both relative humidity and ambient temperature and saves these readings in internal, nonvolatile memory. To use the IQ-TRH, simply set up the logger using your PC's serial port and the IQ Wizard software. Then, disconnect it, deploy it where it's desired, and start the logger. When the recording session is complete, reconnect to your PC and download the data directly into an Excel worksheet.

The IQ-TRH, when logging a single RH channel, can hold 31,920 samples. The IQ-TRH-40 version can hold 64,680 RH samples. With 64,680 samples, you can sample relative humidity once a minute for 45 days or once every 15 minutes for over 22 months!

Typically, the logger is connected to the PC only for initial setup, testing, and uploading data. However, while connected to the PC, data can also be displayed in real time. All data is stored in nonvolatile memory so in the unlikely event of battery failure, your data is available after a new battery is installed.

Sampling can be started:

- · Immediately after configuration,
- by pressing the start button after deployment,
- at a programmed time and date,
- · by pressing the start button to acquire a single sample

Sampling can be programmed to stop when the memory is full, or by pressing the logger button. If not programmed to stop on a full memory, the logger will continue to acquire samples and overwrite old data.

You will need an IQ-PCIK PC Interface Kit to communicate with your IQ logger. The kit includes IQ-Wizard software and a serial cable/adapter. The kit is sold separately and once owned, can be used with any number of data loggers.

Ordering Guide

IQ-TRH RH and Ambient Temp. Logger - 21K Samples RH and Ambient Temp. Logger - 43K Samples IQ-PCIK IQ family PC Interface Kit

Features

- Acquires up to 64,680 RH samples (IQ-TRH-40)
- Fast and easy setup, data-downloads and analysis with IQ WizardTM and ExcelTM.
- Four start-sampling modes (Immediate, key, time, single sample)
- Temperature Conversion to °C (default), °F, or K.
- User-replaceable lithium battery lasts up to 10 years
- 12-bit resolution
- Status LED on logger indicates four operational/alarm conditions
- · Rugged construction of ABS Plastic
- Small size

Performance & Specifications

Data Logging Type A/D resolution	Relative humid	ity & amb. temperature
Sampling rates		4 hours, S/W- selectable
Clock accuracy	±2 seconds per	day
Memory type	nonvolatile	
Maximum sample size Relative humidity only	IQ-TRH	IQ-TRH-40

Relative numberly only		
Single time-stamped sample	5,320 samples	10,780 samples
Periodic samples	31,920 samples	64,680 samples
Temp. and RH		
Single time-stamped sample	3,990 samples	8,085 samples
Periodic samples	10,640 samples	21,560 samples

Internal Temperature Se	ensor
Type	Semiconductor
Range	-40 to 85°C (-40 to 185°F)
Resolution	0.03°C
Relative Accuracy	±0.5°C over entire range
Response Time	10 minutes in still air (to 63%)

Internal Relative Hun	nidity Sensor
Type:	Capacitive
Operating range:	-40 to 125°C (-40 to 257°F)
Resolution:	~1% RH over 15 to 90% RH range
Relative accuracy:	±2%, 15 to 90% at 25°C
Response time	21 minutes in still air (to 63%)

General	
Size	3.1 x 2.5 x 1.0 inches (79 x 64 x 25mm)
Weight	2.8 ounces (80g)
Case	Heavy duty ABS plastic
Front panel	Start/ston button status/alarm I FD

Power Consum	ption	
Battery	3.6 V lit	hium, 2.1 AH
Battery life	Sample Period	Battery Life
	0.125 second	219 days
	1.0 second	3.5 years

>8 seconds

Environmental	
Operating/storage temperature range	-40 to 85°C (-40 to 185°F)
Humidity	0 to 100% noncondensing

9.5 years

IQ-TC, IQ-TC-40

Thermocouple and Ambient Temperature Data Logger



Acquires up to 21,560 Thermocouple samples (IQ-TC-40)

Features

- Supports J, K, T, and E thermocouples
- Filtering for 50, 60 or 120 Hz rejection can be selected
- 12-bit resolution
- User-replaceable lithium battery lasts up to 10 years
- Fast and easy setup, data-downloads and analysis with IQ WizardTM and ExcelTM.
- Temperature Conversion to °C (default), °F, or °K.
- Four start-sampling modes (Immediate, key, time, single sample)

Functional Description

The IQ-TC Thermocouple input data logger is a rugged and versatile device designed for remote, battery-operated monitoring. The unit measures temperature for a wide variety of thermocouple types as well as logging ambient temperature. To use the IQ-TC, set up the logger via your PC's serial port and the IQ Wizard software. Then, disconnect and deploy it where needed and start the logger. When your recording session is complete, reconnect to your PC and download the data directly into an Excel worksheet.

A IQ-TC holds 10,640 thermocouple samples, and the IQ-TC-40 holds 21,560 samples. An IQ-TC-40 can sample once a minute for 15 days or once every 15 minutes for over 7 months!

Typically, the logger is connected to the PC only for initial setup, testing, and uploading data. However, while connected to the PC, data can also be displayed in real time. All data is stored in nonvolatile memory so in the unlikely event of battery failure, your data is available after a new battery is installed.

Sampling can be started:

- Immediately after configuration,
- by pressing the start button after deployment,
- at a programmed time and date,
- by pressing the start button to acquire a single sample

Sampling can be programmed to stop when the memory is full, or by pressing the logger button. If not programmed to stop on a full memory, the logger will continue to sample and will overwrite the oldest data.

You will need an IQ-PCIK PC interface kit to communicate with your IQ logger. The kit includes IQ-Wizard software and a serial cable/adapter. The kit is sold separately and once owned, can be used with any number of data loggers.

Ordering Guide

IQ-TC TC and Ambient Temp. Logger - 21K Samples IQ-TC-40 TC and Ambient Temp. Logger - 43K Samples

IQ-PCIK IQ family PC Interface Kit

Performance & Specifications

Data Logging	
Type	Thermocouple & amb. temperature
A/D resolution	12-bits
Sampling rates	8 Hz to 1 per 24 hours, S/W- selectable
Clock accuracy	±2 seconds per day
Memory type	nonvolatile

Maximum sample size **IQ-TC** IQ-TC-40 Sampling TC and amp temp. 3,990 samples 8,085 samples Single time-stamped sample Periodic samples 21,560 samples 10,640 samples

Internal Temperature Sensor Type

Semiconductor -40 to 85°C (-40 to 185°F) Range 0.03°C Resolution Relative accuracy ±0.5°C over entire range

Response time 11.6 minutes in still air (to 63%)

External Thermocouple Sensor

	Temperature Accu			Accuracy*	
Typ	e Range °C	Resolution	Accuracy	0°C to+FS	Entire range
E	-200 to 900	22.6uV	±92uV	±1.6°C	±3.8°C
J	-200 to 750	15.6uV	±63uV	±1.3°C	±3.1°C
K	-200 to 1250	17.1uV	±69uV	±1.8°C	±4.7°C
T	-200 to 350	8.6uV	±40uV	±1.0°C	±2.5°C

^{*}Does not include thermocouple or cold junction error.

Power Consumption

Battery	3.6V Lit	thium, 2.1 AH
Battery life	Sample Period	Battery Life
THE 040 BILL	0.125 second	150 days
	1.0 second	2.4 years
	>8 seconds	7.2 years

General Size 3.1 x 2.5 x 1.0 inches (79 x 64 x 25mm) Weight 2.8 ounces (80g) Heavy duty ABS plastic Case

Front panel Start/stop button, status/alarm LED

Environmental

Operating/storage temperature range -40 to 85°C (-40 to 185°F) Humidity 0 to 95% noncondensing

Please see our large selection of thermocouples on pages 256-258!

IQ-TempXT, IQ-TempXT-40

Probe-Based and Ambient Temperature Data Logger



Features

- Acquires up to 43,120 temperature samples (IQ-TEMPXT-40)
- Fast and easy setup, data-downloads and analysis with IQ WizardTM and ExcelTM
- Four start-sampling modes (Immediate, key, time, single sample)
- User-replaceable lithium battery lasts up to 10 years
- · Rugged construction of ABS Plastic
- 12-bit resolution
- Temperature Conversion to °C (default), °F, or °K.
- Small size

Functional Description

The IQ-TempXT Probe-based and Ambient Temperature data logger is a rugged and versatile device designed for remote, battery-operated monitoring. The IQ-TempXT measures temperature from probes containing high accuracy semiconductor temperature sensors. To use the IC-TempXT, simply set up the logger using your PC's serial port and the IQ Wizard software. Then, disconnect it from the PC, deploy it where desired and start the logger. When your recording session is complete, reconnect to your PC and download the data directly into an Excel worksheet.

The IQ-TempXT, when logging probe temperature, holds over 21,280 samples. The IQ-TempXT-40 version holds 43,120 samples. You can sample once a minute for 30 days or every 15 minutes for 14 months!

Typically, the logger is connected to the PC only for initial setup, testing, and uploading data. However, while connected to the PC, data can also be displayed in real time. All data is stored in nonvolatile memory so in the unlikely event of battery failure, your data is available after a new battery is installed.

Sampling can be started:

- Immediately after configuration,
- by pressing the start button after deployment,
- at a programmed time and date,
- by pressing the start button to acquire a single sample

Sampling can be programmed to stop when the memory is full, or by pressing the logger button. If not programmed to stop on a full memory, the logger will continue to sample and will overwrite the oldest data.

You will need an IQ-PCIK PC interface kit to communicate with your IQ logger. The kit includes IQ-Wizard software and a serial cable/adapter. The kit is sold separately and once owned, can be used with any number of data loggers.

Ordering Guide

IQ-TempXT IQ-XTP

IQ-PCIK

Probe & Ambient Temp. Logger-21K Samples IQ-TempXT-40 Probe & Ambient Temp. Logger-43K Samples Spare External Temperature Probe

IQ family PC Interface Kit

Performance & Specifications

IQ-TempXT

Data Logging Type A/D resolution Sampling rates Clock accuracy Memory type

Temperature from probe & ambient 12-bits 8 Hz to 1 per 24 hours, S/W- selectable ±2 seconds per day nonvolatile

IQ-TempXT-40

Maximum sample size Probe or ambient temp only Single time-stamped sample Periodic Samples Probe and ambient temp Single time-stamped sample Periodic samples

4,560 samples 9,240 samples 21,280 samples 43,120 samples 3,990 samples 8,085 samples 10,640 samples 21,560 samples

Internal Temperature Sensor Type Range Resolution Relative accuracy Response time

Semiconductor -40 to 85°C (-40 to 185°F) 0.03°C ±0.5°C over entire range 10 minutes in still air (to 63%)

External Temperature Probe Sensor

Type Operating range Resolution Relative accuracy Response time

Semiconductor -40 to 125°C (-40 to 257°F) 0.03°C ±0.5°C over entire range 2.9 minutes in still air (to 63%) 12 in x 1/4 in dia. SS sheath, 10 ft. cable

Power Consumption

Battery Battery life

Size:

3.6V Lithium, 2.1 AH Sample Period **Battery Life** 0.125 second 1.6 years

1.0 second 6.5 years >8 seconds 10 years

General

Size Weight Case Front Panel 3.1 x 2.5 x 1.0 inches (79 x 64 x 25mm) 2.8 ounces (80g)

Heavy duty ABS plastic Start/stop button, status/alarm LED

Environmental

Operating/storage temperature range Humidity

-40 to 85°C (-40 to 185°F) 0 to 95% noncondensing

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IQ-VmA, IQ-VmA-40

Voltage/milliAmp Input and Ambient Temperature Data Logger



Functional Description

The IQ-VmA voltage/milliamp input and ambient temperature data logger is a rugged and versatile device designed for remote, battery-operated data recording. One channel can be used for voltage or current logging (mutually-exclusive) and one channel can be used for ambient temperature logging. To use the IQ-VmA, simply set up the logger using your PC's serial port and the IQ Wizard software. Then, disconnect from the PC, deploy it where needed, and start the logger. When your recording session is complete, reconnect to your PC and download the data directly into an Excel worksheet.

A standard IQ-VmA logging a single channel holds over 21,280 samples, while the IQ-VmA-40 holds 43,120 samples. With 43,120 samples, you can sample once a minute for 30 days or once every 15 minutes for over 14 months!

Typically, the logger is connected to the PC only for initial setup, testing, and uploading data. However, while connected to the PC, data can also be displayed in real time. All data is stored in nonvolatile memory so in the unlikely event of battery failure, your data is available after a new battery is installed.

Sampling can be started:

- · Immediately after configuration,
- by pressing the start button after deployment,
- at a programmed time and date,
- by pressing the start button to acquire a single sample

Sampling can be programmed to stop when the memory is full, or by pressing the logger button. If not programmed to stop on a full memory, the logger will continue to sample and will overwrite the oldest data.

You will need an IQ-PCIK PC Interface Kit to communicate with your IQ logger. The kit includes IQ-Wizard software and a serial cable/adapter. The kit is sold separately and once owned, can be used with any number of data loggers.

Ordering Guide

IQ-VmA V/mA & Ambient Temp. Logger - 21K Samples **IQ-VmA-40** V/mA & Ambient Temp. Logger - 43K Samples

IQ-PCIK IQ family PC Interface Kit

Features

- Nine voltage input ranges and a current input range
- Acquires up to 43,120 samples (IQ-VmA-40)
- User-replaceable lithium battery lasts up to 10 years
- Fast and easy setup and analysis with IQ Wizard and ExcelTM
- Temperature Conversion to °C (default), °F, or °K.
- Four start-sampling modes (Immediate, key, time, single sample)
- · 12-bit resolution
- Status LED indicates operational or alarm conditions
- Small size; 3.1 x 2.5 x 1.0 inches (79 x 64 x 25mm)

Performance & Specifications

Data Logging	
Type	Temperature
A/D resolution	12-bits
Sampling rates	8 Hz to 1 per 24 hours, S/W- selectable
Clock accuracy	±2 seconds per day
Memory type	nonvolatile
No. of the property	TO Y 4 TO Y 4 40

Maximum sample size	IQ-VmA	IQ-VmA-40
Voltage/current only		Lidebley Eviller
Single time-stamped sample	4,560 samples	9,240 samples
Periodic samples	21,280 samples	43,120 samples
Voltage/current and ambient tem	np	
Single time-stamped sample	3,990 samples	8,085 samples
Periodic samples	10,640 samples	21,560 samples

Internal Temperature Sensor	
Type	Semiconductor
Range	-40 to 85°C (-40 to 185°F)
Resolution / relative accuracy	0.03°C/±0.5°C over entire range

11.6 minutes in still air (to 63%)

Response time External Voltage/Current Input

Range	Resolution	Absolute Accuracy*	Typical Accuracy
0 to 20mA	5uA	±30uA	±15uA
±30V	15.8mV	±95mV	±47.4mV
0 to 30V	7.8mV	±47mV	±23.4mV
±10V	5.2mV	±31mV	±15.6mV
0 to 10V	2.6mV	±16mV	±7.8mV
±5V	2.6mV	±17mV	±7.8mV
0 to 5V	1.26mV	±7.6mV	±3.8mV
±1.2V	610uV	±3.6mV	±1.8mV
0 to 1.2V	310uV	±2.0mV	±1.0mV
0 to 333mV	97uV	±750uV	±380uV
		THE RELEASE AND ADDRESS OF THE PARTY OF THE	

* At 25°C and not connected to the computer.

Maximum Input ±6 Vdc

rower Consu	inpuon	
Battery	3.6 V lit	hium, 2.1 AH
Battery life	Sample Period	Battery Life
	0.125 second	185 days
	1.0 second	2.9 years
	> 10 assemble	9.0

Environmental	
Operating/storage temperature range	-40 to 85°C (-40 to 185°F)
Humidity	0 to 95% noncondensing

IQ-Event, IQ-Event-40

Event Counting/Time-Stamping, and Ambient Temperature Logger



Functional Description

The IQ-Event, time-stamping and ambient temperature data logger is a rugged and versatile device designed for remote, battery-operated monitoring. It can be used in a wide variety of counting and time/date stamping applications. To use the IQ-Event, simply set up the logger using your PC's serial port and the IQ Wizard software. Then, deploy it where desired and start the logger. When your recording session is complete, reconnect it to your PC and download one or two channels of the data directly into an Excel worksheet.

When counting events, an IQ-Event logger can hold 15,960 samples. The IQ-Event-40 can hold 32,340 samples or 2.1x109 events! If counting events and monitoring temperature, the IQ-Event holds 7,980 samples, while the IQ-Event-40 version holds 16,170 samples.

Typically, the logger is connected to the PC only for initial setup, testing, and uploading data. However, while connected to the PC, data can also be displayed in real time. All data is stored in nonvolatile memory so in the unlikely event of battery failure, your data is available after a new battery is installed.

Sampling can be started:

- · Immediately after configuration,
- by pressing the start button after deployment, o
- at a programmed time and date,
- by pressing the start button to acquire a single sample

Sampling can be programmed to stop when the memory is full, or by pressing the logger button. If not programmed to stop on a full memory, the logger will continue to sample, and will overwrite the oldest data.

You will need an IQ-PCIK PC Interface Kit to communicate with your IQ logger. The kit includes IQ-Wizard software and a serial cable/adapter. The kit is sold separately and once owned, can be used with any number of data loggers.

Ordering Guide

IQ-Event Event / Time-Stamp Logger - 16K samples
 IQ-Event-40 Event / Time-Stamp and Logger - 32K Samples
 IQ-PCIK IQ family PC Interface Kit

Features

- 16-bit Counter for Event Recording (65,535 events per sample)
- Records up to 32,340 event/samples with IQ-Event-40
- User-replaceable lithium battery lasts up to 10 years
- Fast and easy setup and analysis with IQ Wizard and ExcelTM
- 12-bit resolution for Temperature
- Temperature Conversion to °C (default), °F, or °K.
- Four start-sampling modes (Immediate, key, time, single sample)
- Status LED indicates operational or alarm conditions
- Small size: 3.1 x 2.5 x 1.0 inches (79 x 64 x 25mm)

Performance & Specifications

Data Logging		
Type	Temperature	
A/D resolution	12-bits	
Sampling rates	8 Hz to 1 per 24 h	nours, S/W- selectable
Clock accuracy	±2 seconds per da	ay
Memory type	nonvolatile	
Maximum sample Size Event only	IQ-Event	IQ-Event-40
Single time-stamped sample	6,384 samples	12,936 samples
Periodic samples	15,960 samples	32,340 samples
Event and ambient temp		a de mar tederato A
Single time-stamped sample	4,560 samples	9,240 samples
Periodic samples	7,980 samples	16,170 samples
Internal Temperature Sensor		
Type	Semiconductor	
Range	-40 to 85°C (-40 t	to 185°F)
Resolution / relative accuracy	0.03°C/±0.5°Co	ver entire range
Response time	10 minutes in still	

Event Input Modes:

Event counting:

Event time stamp:	1 time stamp max once per 0.125 sec.
Input impedance:	1 Megohm
Inputs:	
Switch closure:	1 kilohm max
Voltage input:	±60V max
Thresholds:	S/W-selectable, 1.18V, 0.58V, or 0.29V
	(each range with ±50mV hysteresis)
Debounce time constant	t =13.8 ms, S/W-enabled
Trigger (software-selectable):	rising/switch open or
	falling/switch closed
10.	250 5

16-bit counter

Minimum duration: 250us Event only*
330us Event and Temp*
*Multitasking timing inaccuracies may cause missed pulses while communicating to PC.

Power Consumption

Battery	3.6 V lithium, 2.1 AH	
Battery life	Sample Period	Battery Life
	0.125 second	250 days
	1.0 second	1.0 years
	>3 seconds	1.1 years

Environmental

Operating/storage temperature range -40 to 85°C (-40 to 185°F) Humidity 0 to 95% noncondensing

IQ-PCIK

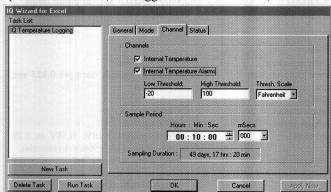
PC Interface Kit for IQ-Data Logger



Description

To interface IQ data loggers to your computer, you will need an IQ-PCIK, PC Interface Kit (sold separately from the IQ Loggers). The kit includes an IQ-COM serial cable/adapter and IQ-Wizard software. (IQ-Wizard requires Windows 95/98/NT and Excel 97.)

To start, simply launch Excel, start the IQ Wizard add-in and connect the logger to a serial port on your PC using the special IQ-COM cable/adapter that comes with the kit. Then, using IQ-Wizard, it's very easy to configure your loggers with the desired sample rate, thresholds, start method, etc. Finally, unplug the logger, place it where desired, and start recording data. If desired, you can configured an IQ Logger to start recording data at once, when the logger button is pressed, or at specified time/date (each logger has a built-in clock).

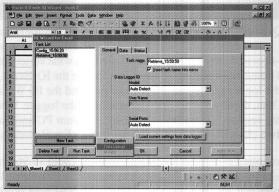


Data logger setup using IQ Wizard is easy. Check the boxes for the samples you'd like to take, select the start method and sample rate, and click OK. Your IQ Logger's ready to go!

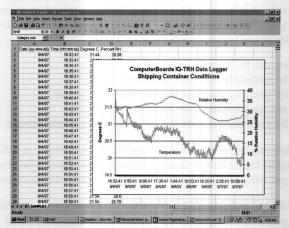
Data retrieval is simple with built-in dialog boxes, allowing you to download your logged data into cells in your worksheet. After the recording session is over, retrieve the logger and reconnect it to the PC. IQ-Wizard will handle details such as engineering unit conversion and time-stamping the data. Excel can perform such tasks as X-Y data plotting or other more complex data processing functions after the data is unloaded. Once the data is downloaded, you're ready relaunch the logger on the same task or select a new one.

Features

- Includes IQ-Wizard software and PC interface cable/ adapter.
- Place data directly into Excel spreadsheets
- Only one kit is required for multiple data loggers.
- · Easy to use
- Engineering unit conversion and time-stamping is done automatically on data retrieval.
- IQ-Wizard software is task-oriented for fast, accurate configuration and efficient data retrieval.
- All tasks are stored for easy repetition.



Downloading the data from the logger is as simple as selecting what cells you'd like to receive the date. To simplify things further, you can even save download configurations (as shown above).



With your data automatically placed into cells in your Excel worksheet, you're ready to take advantage of the powerful display and analysis tools built into Excel.

PC Interface Kit Ordering

IQ-PCIK IQ-COM IQ Family PC Interface Kit

Spare/additional PC interface cable assembly

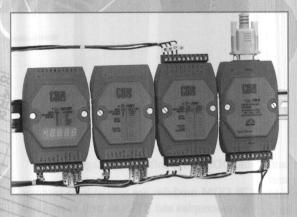
For information on our serial communications products please see pages 210-208

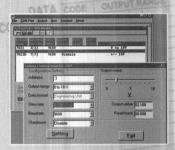
CB-Com Series

RS-485-based distributed & remote I/O



CB COM Communications Interfaces





CB COM Utility Software finds all active modules on the network and displays the current system status

	OD COLL COLLING	aneatons interaces					
	CB-7520	Isolated RS-232 to RS-485 Converter for use with CB-COM series	248				
	CB-7510	Isolated RS-485 Repeater for use with CB-COM series	248				
	CB COM I/O Modules						
	CB-7011 & 7011D	Single Channel Thermocouple Input Module (D version with LED display)	249				
Name :	CB-7012 & 7012D	Single Channel Voltage or 4-20 mA Input Module (D version with LED display)	249				
	CB-7013 & 7013D	Single Channel RTD Input Module (D version with LED display)	249				
	CB-7017	8 Channel Voltage or ±20 mA Input Module	250				
	CB-7018	8 Channel Thermocouple Input Module	250				
	CB-7021	Single Channel Analog Voltage or Current Output Module	250				
NEW!	CB-7024	4 Channel Analog Voltage or Current Output Module	251				
	CB-7041	14-Bit Isolated Input Modules (Inputs have common ground)	251				
	CB-7042	13-Bit Isolated Open Collector Output Module	251				
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	CB-7044	Isolated Digital I/O Module, 4 Input, 8 Output	251				
	CB-7050	15-Bit Digital I/O Module, 7-Bits Input, 8-Bits Output	252				
	CB-7052	Isolated 8-Bit Digital Input Module	252				
	CB-7053	16-Bit Contact Monitoring Digital Input Module	252				
	CB-7060	4 Relay Output Module (2 Form A NO, 2 Form C) with 1 Digital Input	252				
NEW!	CB-7063	3 Channel Relay Output Module with 8 Digital Inputs	252				
NEW!	CB-7063A & B	Solid-state Relay Output Module with 8 Digital Inputs	252				
	CB-7067	7 Relay Output Module (all Form A NO)	253				
	CB-7080 & 7080D	2 Channel 32-Bit Counter/Frequency Input Module (D version with LED display)	253				
	CB COM Softwar	e 2048 modules man, with repeater 2	254				
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CB COM Serial (RS-485) analog and digital I/O modules

Applications

- · Networked Data Acquisition
- · Building Automation
- · Security Systems
- · Agricultural Automation
- · Distributed Measurement and Control
- Factory Floor Monitoring
- · Process Monitoring and Control



Functional Description

The CB COM family provides a simple and cost effective method of monitoring and controlling both analog and digital real world signals with any computer equipped with a serial port.

All CB COM modules are microprocessor controlled and communicate over a simple 2wire RS-485 port. The CB-7520 RS-232 to RS-485 converter provides the serial translation and provides 3000 Vdc of isolation between the CB COM network and your computer. The isolation protects your computer and increases data reliability by eliminating ground loop and common mode problems.

Programming the CB COM family is as easy as writing and reading a few simple ASCII strings to your computer's serial port. Most users choose to write programs that directly write and read the ASCII strings, though the CB COM family is also supported by both DLL

and DDE driver software packages.

CB COM modules are available to monitor thermocouples and RTDs as well as standard voltage and 4-20 mA inputs. The temperature measurement modules automatically convert their output into degrees. All analog input modules utilize a 16-bit Sigma-Delta A/D converter to ensure accurate measurements. The "D" series modules not only send information to your computer, they include an LED display that provides real-time local display of your measurement.

The analog output modules provide either voltage or current outputs and offer ±0.1% of FSR accuracy. The CB-7017's programmable slew rate is controlled by the microprocessor and can change the output voltage gradually and not exceed the controlled system's limits. The CB-7017 also includes an A/D converter connected directly to the output. This allows the detection of fault conditions such as shorts or open circuits.

The CB COM family also provides a wide assortment of logic level and high voltage/ current digital input, output and counter-timer modules.

Common Specifications

- Isolation voltage: 3000 Vdc min
- Serial data rate: 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200
- Built-in watchdog timer on Micro
- Power required: +10 to +30 V
- Reverse power protected
- Din-Rail or panel mounting
- Plug-in screw terminal
- Allows HOT SWAP replacements
- Operating temperature: 14 to 158 °F
- Storage temperature: -13 to 185 °F
- Humidity: 5 to 95%, non-condensing

RS-232 to RS-485 Converter & CB-7510 RS-485 Repeater



Features

- · Self Tuner automatically sets baud rate to match the host computer.
- 3000 Vdc Isolation
- Allows 256 modules in a single CB COM network

CB-7520 Specifications

Input: RS-232 protocol

Provides female 9-pin D Connector:

(see page 78 in this handbook

for interconnecting cables)

Output: RS-485 protocol

(two wire, D+, D-)

Baud Rate: "Self Tuner" auto switching

baud rate, 300 to 115200 bps

Modules: 256 modules max, in one RS-485

network without repeater

2048 modules max. with repeater

Isolation: 3000 Vdc

Line Length:

4,000 feet or over 256 modules Power: 2.2 W max from 10 to 30 Vdc

CB-7510 Specifications

Input: RS-485 protocol (two wire

connects via screw terminals)

Output: RS-485 protocol (two wire connects via screw terminals)

"Self Tuner" auto switching

baud rate, 300 to 115200 bps

Isolation: 3000 Vdc

Speed:

Power: 2.2 W max from 10 to 30

CB-7011 & CB-7011D Thermocouple input modules



Features

- · Supports 9 types of Thermocouple
- 16-bit conversions
- · 1 digital input
- · 2 digital outputs
- 7011D displays temperature on 4.5 digit LED display

CB-7011 Specifications

Input type: Thermocouple, mV, V, or mA

Channels:

Thermocouple types:

J, 0 to 760 °C K,0 to 1000 °C T, -100 to 400 °C E,0 to 1000 °C R, 500 to 1750 °C S, 500 to 1750 °C

B, 500 to 1800 °C N, -270 to 1300 °C

C, 0 to 2320 °C

Voltage ranges: ±15 mV, ±50 mV, ±100 mV,

±500 mV, ±1 V, ±2.5 V

Current range: ±20 mA

Sampling rate: 10 samples/sec

Bandwidth: 4Hz

Accuracy: ±0.05% or better ±0.033 ppm/°C Zero drift:

CMR @ 50/60 Hz: 150 dB NMR @50/60 Hz: 100 dB Over voltage protection: ±10V

Span drift: 25ppm/°C

Digital Input

Channels: 1 Logic 0: 0 to 1 V

Logic 1: 3.5 to 30 V

Digital Output

Channels: 2 Open collector to 30 V,

30 mA load max.

Display: LED: 41/2 digit(I-7011D)

Power consumption: 1.5 W for I-7011

2.2 W for I-7011D

CB-7012D Voltage or 4-20 mA input modules CB-7012



Features

- Voltage or current inputs
- 16-bit conversions
- 1 digital input
- 2 digital outputs
- 7012D displays voltage on 4.5-digit LED display

CB-7012 Specifications

Input type:

mV, V, or mA

Channels:

±10 V, ±5 V, ±1 V, Voltage ranges:

±20 mA

±500 mV, ±150 mV, ±20 mA

Current range:

Sampling rate: 10 samples/sec

Bandwidth: 4Hz

Accuracy: ±0.05% or better Zero drift: ±0.033 ppm/°C

Span drift: 25ppm/°C CMR @ 50/60 Hz: 150 dB

NMR @50/60 Hz: 100 dB Over voltage protection: ±10V **Digital Input**

Logic 0: 0 to 1 V Channels:

Logic 1: 3.5 to 30 V

Digital Output

Channels:

2 Open collector to 30 V,

30 mA load max.

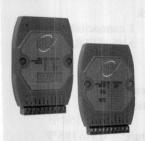
General Specifications

LED: 41/2 digit (I-7012D) Display:

Power consumption: 1.5 W for I-7012

2.2 W for I-7012D

CB-7013 & CB-7013D RTD input modules



Features

- Voltage or current inputs
- 16-bit conversions
- · 1 digital input
- 2 digital outputs
- 7013D displays voltage on 4.5 digit LED display

CB-7013 Specifications

Channels:

Connection type: 2/3/4 wire

RTD types: Pt, Ni

RTD temperature range

-100 to +100°C a=0.00385 Pt100 Pt100 0 to +100 °C a=0.00385 Pt100 0 to +200 °C a=0.00385

Pt100 0 to +600 °C a=0.00385 Pt100 -100 to +100°C

a=0.003916 0 to +100 °C Pt100 a=0.003916 Pt100 0 to +200 °C a=0.003916

Pt100 0 to +600 °C -80 to +100 °C Ni120 Ni120 0 to +100 °C

Sample rate:

10 samples/sec

Bandwidth: 4Hz

Accuracy: ±0.05% or better Zero drift: ±0.3uV/°C Span drift: ±25ppm/°C CMR @ 50/60 Hz: 92 dB min

NMR @50/60 Hz: 100 dB

General Specifications

Power consumption: 2W for I-7013

2.2W for I-7013D

a=0.003916

CB-7017 8-channel voltage or 4-20 mA input modules



Features

- 8 differential inputs
- Voltage or current inputs
- 10 samples/second (total)
- 16-bit conversions

CB-7017 Specifications

Channels: 6 differential + 2 single-ended

or 8 differential (jumper select)

Input type: mV, V, mA

Input range: $\pm 150 \,\text{mV}$, $\pm 500 \,\text{mV}$, $\pm 1 \,\text{V}$,

 ± 5 V, ± 10 V and ± 20 mA

Resolution: 16-bit

Sample rate: 10 sample/sec(total)

Bandwidth: 13.1 Hz

Accuracy: ±0.1% or better Zero drift: ±0.03 uV/°C Span drift: ±25 ppm/°C CMR @ 50/60 Hz: 92 dB min

Over voltage protection: ±35 V

General Specifications

Isolation voltage: 3000 Vdc min

Serial data rate: 1200, 2400, 4800, 9600,

19200, 38400, 57600,

115200

Power required: +10 to +30 V

Power consumption: 2 W

Operating temp: 14 to 158 °F Storage temperature: -13 to 185 °F Humidity: 5 to 95%,

non-condensing

CB-7018 8-channel thermocouple input modules



Features

- Supports 9 types of Thermocouple
- 16-bit conversions
- 8 input channels

CB-7018 Specifications

Input type: Thermocouple, mV, V, or mA

Channels: 8

Thermocouple types:

J, 0 to 760 °C K, 0 to 1000 °C T, -100 to 400 °C E, 0 to 1000 °C R, 500 to 1750 °C S, 500 to 1750 °C B, 500 to 1800 °C N, -270 to 1300 °C

C, 0 to 2320 °C

Voltage ranges: $\pm 15 \,\text{mV}, \pm 50 \,\text{mV}, \pm 100 \,\text{mV},$

±500 mV, ±1 V, ±2.5 V

Current range: ±20 mA
Sampling rate: 10 samples/sec

Bandwidth: 4Hz

Accuracy: $\pm 0.05\%$ or better Zero drift: ± 0.033 ppm/°C

Span drift: 25ppm/°C CMR @ 50/60 Hz: 150 dB NMR @50/60 Hz: 100 dB Over voltage protection: ±10V

General Specifications

Power consumption: 2 W

Operating temp: 14 to 158 °F Storage temperature: -13 to 185 °F Humidity: 5 to 95%,

non-condensing

CB-7021 Analog voltage or current output modules



Features

- · Analog output module
- 12-bit conversions
- Analog read-back
- · Programmable slew rate
- Voltage or 4-20 mA output

CB-7021 Specifications

Output type: mV, V, or mA

Channels:

Voltage range: 0 to 10 Vdc Current ranges: 0 to 20 mA and

1

4 to 20 mA

Accuracy: $\pm 0.1\%$ of FSR Zero drift: $\pm 30 \text{ uV/°C (V out)}$

 $\pm 0.2 \, \text{uA/}^{\circ}\text{C} \, (\text{I out})$

Span drift: 25ppm/°C

Programmable Slew Rate

Voltage mode: 0.0625 to 64.9 V/sec Current mode: 0.125 to 128 mA/sec Analog Readback

Channels: 1 connected to output

Accuracy: $\pm 1\%$ of FSR

General Specifications
Power consumption: 2 W

Operating temp: 14 to 158 °F

Storage temperature: -13 to 185 °F Humidity: 5 to 95%,

non-condensing

CB-7024 4-Channel analog output modules



Features

- 4 Analog outputs
- 14-bit conversions
- Analog read-back
- · Programmable slew rate
- · Voltage or 4-20 mA output

CB-7021 Specifications

Output type: mV, V, or mA

Channels:

Voltage range: 0 to 10 Vdc, ± 10 Vdc

0 to 5 Vdc, ±5 Vdc

0 to 20 mA and Current ranges:

4 to 20 mA

Accuracy: Zero drift:

±0.1% of FSR ±15 uV/°C (V out)

±0.2 uA/°C (I out)

Span drift: 20 ppm/°C

Programmable Slew Rate

Voltage mode: 0.0625 to 64.9 V/sec Current mode: 0.125 to 128 mA/sec **Analog Readback**

Channels: 1 connected to output

Accuracy: ±1% of FSR

General Specifications

Power consumption: 2.4 W

Operating temp: 14 to 158 °F Storage temperature: -13 to 185 °F Humidity: 5 to 95%,

non-condensing

CB-7041 Isolated digital input



Features

ground

· Low cost

· 14 digital inputs

· Inputs share common

Description & Specifications

Input bits: 14 share

common +/pwr

Logic levels:

LOW HIGH +1.0 Vdc max +3.5 to +30 Vdc

Input impedance: 3 kohm Input Isolation:

3000 Vrms

Power consumption: 0.8 W

Operating temp: 14 to 158 °F

Storage temp: -13 to 185 °F

CB-7042 Isolated output modules



Description & Specifications Outputs: 13

Output type: Open collector Output voltage: 30V max Output current: 100 mA max

(enough output current to drive

many types of relays) Isolation voltage: 3750 V

Power consumption: 0.8 W Operating temp: 14 to 158 °F Storage temp: -13 to 185 °F Humidity: 5% to 95%,

non-condensing

Features

- · 13 digital outputs (share common gnd)
- · Open collector outputs
- Drives DR-OAC/ODC
- 100 mA outputs

CB-7043 Open collector output



Features

- · 16 digital outputs (non-isolated)
- Open collector outputs
- Drives DR-OAC/ODC
- 100 mA outputs

Description & Specifications

Outputs: 13

Output type: Open collector

Output voltage: 30V max

Output current: 100 mA max

(enough output current to drive

many types of relays)

Isolation voltage: NONE

Power consumption: 0.6 W

Operating temp: 14 to 158 °F

Storage temp: -13 to 185 °F Humidity: 5% to 95%,

non-condensing

CB-7044 Isolated digital I/O



Features

- 4 digital input bits
- · 8 digital output bits
- · Low power consumption

Description & Specifications

Input bits:

Isolated (share common pwr/+)

Logic levels:

LOW +1.0 VDC max HIGH +3.5 to +30 Vdc

Output bits: 8

Open collector Output config:

Max voltage: 30 V

Output current: 600 mA max.

(3 A total max)

Power consumption: 0.8 W 14 to 158 °F

CB-7050 15-bit digital I/O



Features

- 7 digital input bits
- · 8 digital output bits
- · Low power consumption

Description & Specifications

Input bits:

Logic levels:

LOW

+1.0 Vdc max

HIGH

+3.5 to +30 Vdc

Output bits: Output config:

Open collector

Max voltage:

Output current:

30 V 30 mA max.

Power consumption: 0.4W

Operating temp: Storage temp:

14 to 158 °F -13 to 185 °F

Humidity:

5% to 95%.

non-condensing

CB-7052 Isolated digital input



Features

- · Isolated inputs
- 8 inputs
- 6 fully isolated
- · 2 share common ground
- · High voltage inputs

Description & Specifications

Input bits:

6 fully isolated 2 share common

ground

Logic levels:

LOW

+1.0 Vdc max

HIGH +3.5 to +30 Vdc

Input impedance: 3 kohm Input Isolation: 3000 Vrms

Power consumption: 0.4 W Operating temp: 14 to 158 °F

Storage temp: -13 to 185 °F

CB-7053 Contact monitor input



Description & Specifications

Input bits:

16

Logic levels:

LOW

contact closed to

ground, or

<2 Vdc

HIGH

contact open or

+4 to 30 Vdc

Effective distance: 500 meters

Features

- 16 inputs
- Direct contact monitoring
- · Low cost

Power consumption: 0.8 W

Operating temp: 14 to 158 °F Storage temp:

-13 to 185 °F

Humidity:

5% to 95%,

non-condensing

CB-7060 Relay output/digital input



Features

- · 4 isolated inputs w/common ground
- · 4 Relays (2 Form C 2 Form A NO)
- · 0.6 A@125 Vac
- 2 A@ 30 Vdc

Description & Specifications

Digital Inputs

Channels: 4 isolated but

share common pwr/+

+1 V max. Logic level 0:

Logic level 1: +3.5 to 30 V

Isolation voltage: 3750 Vrms

Input impedance: 3 kohm,

0.5 W max

Relay outputs Channels:

2 Form A (spst) NO

2 Form C (spdt)

Contact ratings:

AC: 125 V@0.6 A; 250 V@0.3A

DC: 30 V@2 A; 110 V@0.6A

CB-7063 Relay output/digital input



Features

- 8 isolated inputs w/common ground
- Relays (Form A)
- 5 A@ 250 Vac • 5 A@ 30 Vdc

Description & Specifications Digital Inputs

Channels: 8 isolated but

share common gnd

Logic level 0:

+1 V max.

Logic level 1:

+3.5 to 30 V Isolation voltage: 3750 Vrms

Input impedance: 3 kohm,

Relay outputs

Channels:

3 (dry contact)

2 Form A (spst) NO

0.5 W max

Contact ratings:

AC: 250 V@5A DC: 30 V@ 5 A

Breakdown V: 500 Vac (50/60 Hz)

CB-7063A & B Solid State Relay



Features

- 8 isolated inputs w/common ground
- 3 Relays (Solid-State) · 1 A @ 24 - 265 Vac
- 1 A@3-30 Vdc

Description & Specifications Digital Inputs

Channels: 8 isolated but

share common gnd Logic level 0: +1 V max.

Logic level 1: +3.5 to 30 V

Isolation voltage: 3750 Vrms Input impedance: 3 kohm,

0.5 W max

Relay outputs

Channels: 3 (Solid-State)

> 7063A AC output

1 A@ 24 - 265 Vac

7063B DC output

1 A@3-30 Vdc

Breakdown V: 500 Vac (50/60 Hz)

CB-7067 Relay output



Features

7 relay outputsForm A (spst) N.O.

• 0.5 A@ 120 Vac

• 1 A @ 24 Vdc

Description & Specifications

Relays:

Configuration: Form "A" relay

SPST N.O.

Contact type: I

Dry

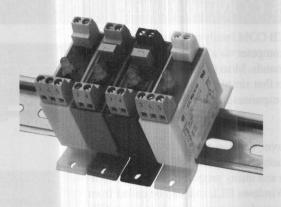
Contact ratings:

AC 120 V@0.5 A DC 24 V@1 A

Surge strength: 1500 Vac Relay on time (typical): 5 ms

Power consumption: 0.8 W Operating temp: 14 to 158 °F

Storage temp: -13 to 185 °F Humidity: 5% to 95%, non-condensing



For higher output capability, please refer to the DR-OAC and DR-ODC solid state I/O modules!

CB-7080 & CB-7080D Counter/timer modules



Features

- 2 independent 32-bit counters
- 50 kHz input freq.
- 1 digital input bit
- 2 digital output bits

CB-7080 Specifications
Counters: 2 independent

Counter depth: 32 bits
Input frequency: 50 kHz max.

Input mode: Isolated or non-isolated

Isolation input levels:

Logic level 0: +1 V max. Logic level 1: +3.5 to 30 V Isolation voltage: 5000 Vrms

Non-Isolated input level are programmable

Programmable Threshold voltage
Logic level 0: from 0 to +5 V
Logic level 1: from 0 to +5 V
Input pulse width: 10 us min

Programmable digital noise filter: 8 us to 262 ms

Frequency Measurement Range: 5 Hz to 50 Hz

Programmable built-in gate time: 1.0/0.1 sec

Digital Input Channels: 1

> Logic 0: 0 to 1 V Logic 1: 3.5 V to 30 V

Digital Output

Channels: 2 Open collector to 30 V,

30 mA load max.

Display LED: 5 digit (I-7080D) monitor either

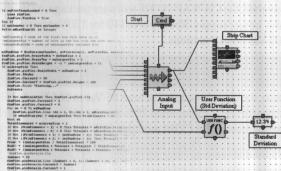
CH0 or CH1

Power consumption: 2 W



Graphical Programming for Visual Basic

The power and flexibility of syntactical programming



The speed and simplicity of graphical programming

Introducing SoftWIRE™

Graphical Programming in Visual Basic®

Syntactical programming has been around since the early days of computers. More recently, graphical programming languages have been introduced and are now a popular alternative to writing hard core, text-based syntax. What's been lacking is an easy way to combine the speed and ease of use of graphical programming with the flexibility and efficiency of writing code in an industry standard language. Until now—Introducing SoftWIRE.

For more information on SoftWIRE, please see pages 6 -10 in this catalog.

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CB COM software

The CB COM family communicates with the host computer via a number of simple ASCII commands. Most users choose to write programs that simply write commands to, and read responses from their computer's serial port.

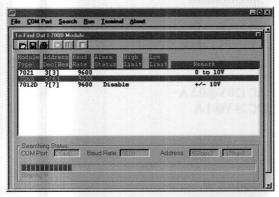
However, there are three CB COM software products available. The CB-NAP7000S is a demo and utility program. CB-NAP-7000P is a Windows DLL that can be called from most popular programming languages. CB-NAP-7000D is a DDE (dynamic data exchange) server.

CB-NAP-7000S

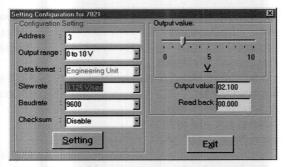
The first component of the software is the CB-NAP-7000S package that is included with every CB COM order. The 7000S provides general CB COM series utility functions including module setup, test, and demonstration functions. The 7000S series runs under DOS, Windows 3.1, WIN 95 or NT.

All source code is provided on the disk. The CB-NAP-7000S provides the following functions.

- 1. Initialize RS-232, open and close COM ports.
- Send/Receive CB-7000 series commands. Provides a simple method to set up and test any active modules



The start-up utility screen searches out all active modules and provides the current system status.



Simply double click on any active module and a helpful setup, diagnostic and test menu appears.

(Utility Functions continued)

- 3. Search the 2048 module network space for active modules
- 4. Tests the stability of the current RS-485 network.

CB-NAP-7000P

The CB-NAP-7000P package is a WIN-32 DLL designed for the Windows 95 or Windows NT user. It can be called by Visual C++, Visual Basic, and many other popular programming languages. In addition to providing a variety of standard serial communications functionality, it also provides a variety high-level CB COM specific functions. These include:

- 1. AnalogIn
- AnalogOut
 DigitalIn
- 4. DigitalOut
- NetworkIns
- 6. NetworkOuts

CB-NAP-7000D

The CB-NAP-7000D software is a hot-link DDE (Dynamic Data Exchange) server. The DDE is a communications protocol that enables the exchange of data between Windows applications. The CB-NAP-7000D is designed to pass the CB-7000 series data to the user via this hot-link.

CB COM Evaluation kits

CB-IKIT-02/AC110 & CB-IKIT-02/AC220

Prewired, ready-to-connect analog input system. The system includes one CB-7012D voltage/current input module with built-in display, one CB-7520 RS-232 to RS-485 converter, the CB-NAP-7000S software package, a DB-9 to DB-9 cable and CB-PWR-24 series power supply. Specify/AC110 for 120 Vac power or/AC220 for 200 Vac power versions.

CB-IKIT-06/AC110 & CB-IKIT-06/AC220

Prewired, ready to connect I/O system. The system includes one CB-7012D voltage/current input module w/display, one CB-7060 digital I/O module, one CB-7021 analog output module, one CB-7520 RS-232 to RS-485 converter, the CB-NAP-7000S software package, a DB-9 to DB-9 cable and power supply. Specify /AC110 for 120Vac power or /AC220 for 200 Vac power versions.

CB COM accessories

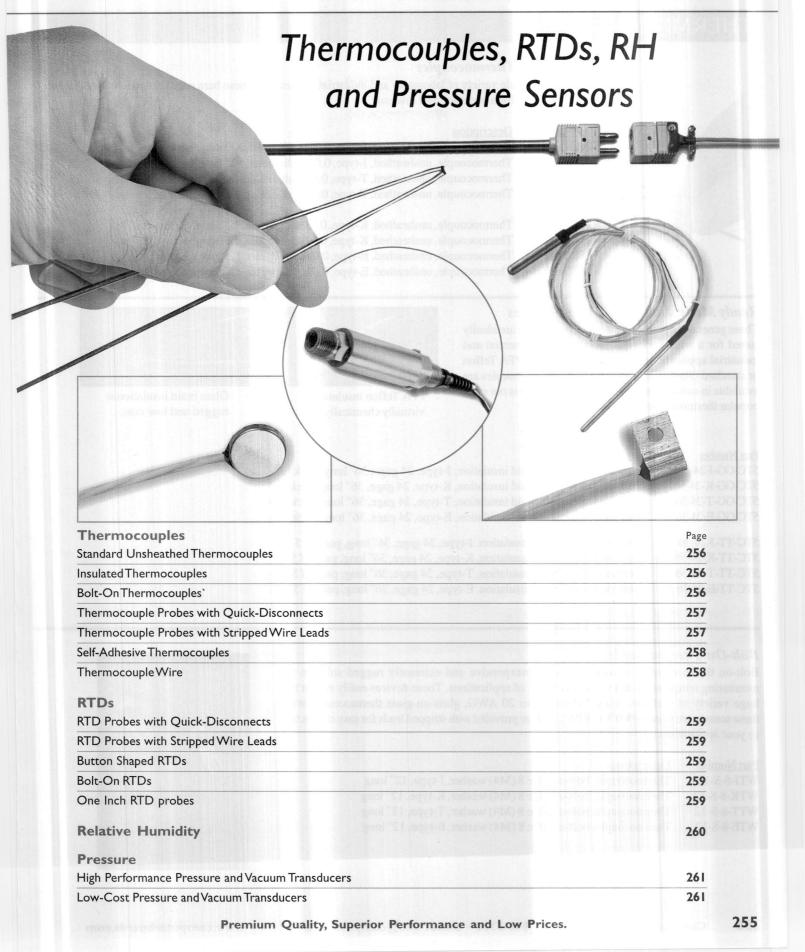
CB-PWR-24/110V: 110 VAC, 24 Vdc direct plug-in power supply suitable for use with the CB COM series. Provides 28.6 Vdc output at zero load and $24.0 \text{ V} (\pm 5\%)$ at 100 mA.

CB-PWR-24/220V: 220 VAC, 24 Vdc direct plug-in power supply suitable for use with the CB COM series. Provides 29.4 Vdc output at zero load and $24.0 \text{ V} (\pm 5\%)$ at 100 mA.

CB-ACE-540A: Provides 24 Vdc at 2A from 85 Vac to 264 Vac (47 Hz to 63 Hz). With efficiency higher than 70% this power supply is well suited to power a series of CB COM modules. All connections are via screw terminal.

CB-DIN-540A: Is a DIN rail mountable version of the CB-ACE-540A.

Sensors and Transducers

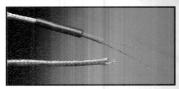


Ready Made, Insulated Thermocouples

These general purpose, insulated thermocouples are ideally suited for a wide variety of laboratory, commercial and industrial applications. Available with either PFA Teflon or standard Glass Braid insulation, the thermocouples are available in convenient 5-packs. The 5TC series is our most popular thermocouple.



PFA Teflon insulation is virtually chemically inert.



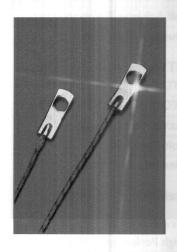
Glass braid insulation is rugged and low cost.

Part Number	Description
5TC-GG-J-24-36	Thermocouple, glass braid insulation, J-type, 24 gage, 36" long, pack of 5
5TC-GG-K-24-36	Thermocouple, glass braid insulation, K-type, 24 gage, 36" long, pack of 5
5TC-GG-T-24-36	Thermocouple, glass braid insulation, T-type, 24 gage, 36" long, pack of 5
5TC-GG-E-24-36	Thermocouple, glass braid insulation, E-type, 24 gage, 36" long, pack of 5
5TC-TT-J-24-36	Thermocouple, Teflon insulation, J-type, 24 gage, 36" long, pack of 5
5TC-TT-K-24-36	Thermocouple, Teflon insulation, K-type, 24 gage, 36" long, pack of 5
5TC-TT-T-24-36	Thermocouple, Teflon insulation, T-type, 24 gage, 36" long, pack of 5
5TC-TT-E-24-36	Thermocouple, Teflon insulation, E-type, 24 gage, 36" long, pack of 5

Bolt-On Thermocouples

Bolt-on thermocouples provide a simple, inexpensive and extremely rugged solution for monitoring temperature in a wide assortment of applications. These devices easily mount to a huge variety of surfaces. Manufactured from 20 AWG, glass-on-glass thermocouple wire, these sensors are rated to $900^{\circ}F$ ($482^{\circ}C$), and are provided with stripped leads for easy connection to your application.

Part Number	<u>Description</u>
WTJ-8-S-12	Thermocouple, bolt-on, size 8 (M4) washer, J-type, 12" long
WTK-8-S-12	Thermocouple, bolt-on, size 8 (M4) washer, K-type, 12" long
WTT-8-S-12	Thermocouple, bolt-on, size 8 (M4) washer, T-type, 12" long
WTE-8-S-12	Thermocouple, bolt-on, size 8 (M4) washer, E-type, 12" long



SENSORS & TRANSDUCERS

THERMOCOUPLES

Stainless Steel Thermocouple Probes with Quick Disconnects

These popular probes are made from 304 stainless steel and are available in four thermocouple types, in three different probe diameters and with the thermocouple grounded to, or isolated from the probe itself. Connections to the probes are through easy to use, color coded, molded connectors. The price includes the mating connector and wire clamp.

FEATURES

- · Color Coded Quick Disconnect Connectors
- High Strength 304 Stainless Steel
- Bendable Probe Design
- · Grounded to or Isolated from the Probe
- 3 probe diameters available



#-QSS-116G-12 TC probe, 1/16" (1.59mm), 304 SS, grounded #-type, 12" long, quick disconnect TC probe, 1/8" (3.18mm), 304 SS, grounded #-type, 12" long, quick disconnect TC probe, 1/4" (6.35mm), 304 SS, grounded #-type, 12" long, quick disconnect

Available in J, K, T and E type thermocouples. To order simply replace # in the part number and description with J, K, T, or E. Price includes mating connector.

Thermocouple electrically isolated from probe

#-QSS-116U-12 TC probe, 1/16" (1.59mm), 304 SS, ungrounded #-type, 12" long, quick disconnect TC probe, 1/8" (3.18mm), 304 SS, ungrounded #-type, 12" long, quick disconnect TC probe, 1/4" (6.35mm), 304 SS, ungrounded #-type, 12" long, quick disconnect

Available in J, K, T and E type thermocouples. To order simply replace # in the part number and description with J, K, T, or E. Price includes mating connector.



Stainless Steel Thermocouple Probes with Stripped Lead Wires These popular probes are made from 304 stainless steel and are available in four thermocouple types, in three different probe diameters and with the thermocouple grounded to, or isolated from the probe itself. Connections to the probes are provided through pre-stripped wire leads. These probes are rated for usage up to 900°C(1650°F).

FEATURES

- High Strength 304 Stainless Steel
- Bendable Probe Design
- Grounded to or Isolated from the Probe
- 3 probe diameters available

Thermocouple electrically grounded to probe

#-TSS-116G-12 TC probe, 1/16" (1.59mm), 304 SS, grounded J-type, 12" long TC probe, 1/8" (3.18mm), 304 SS, grounded J-type, 12" long TC probe, 1/4" (6.35mm), 304 SS, grounded J-type, 12" long TC probe, 1/4" (6.35mm), 304 SS, grounded J-type, 12" long

Available in J, K, T and E type thermocouples. To order simply replace # in the part number and description with J, K, T, or E

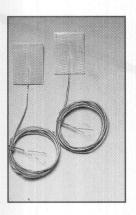
Thermocouple electrically isolated from probe

#-TSS-116U-12 TC probe, 1/16" (1.59mm), 304 SS, ungrounded J-type, 12" long TC probe, 1/8" (3.18mm), 304 SS, ungrounded J-type, 12" long TC probe, 1/4" (6.35mm), 304 SS, ungrounded J-type, 12" long

Available in J, K, T and E type thermocouples. To order simply replace # in the part number and description with J, K, T, or E

THERMOCOUPLES

Self-Adhesive, Fast Response Thermocouples



These self-adhesive thermocouples are designed to allow simple, fast-response measurement of surface temperatures. The sensors are manufactured from 30 AWG, Teflon coated wire with a flattened bead thermocouple secured between high temperature polymers that provide both excellent thermal conductivity and mechanical strength. The sensors provide better than 0.3 second response times and are rated for use from -75 to 350 °F (-59 to 177 °C). For easy installation, the sensors have a self-adhesive backing. No other adhesives are required. The units are provided with stripped leads for easy connection to your application.

<u>Description</u> (sold in packages of 5)
Thermocouple, self-adhesive, J-type
Thermocouple, self-adhesive, K-type
Thermocouple, self-adhesive, T-type
Thermocouple, self-adhesive, E-type

Thermocouple Wire

Bare Thermocouple Wi	re
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SPIR-020	Thermocouple wire, Iron for J-type, 0.020" diameter, 50 feet (15 m) spool, bare wire
SPIR-032	Thermocouple wire, Iron for J-type, 0.032" diameter, 50 feet (15 m) spool, bare wire
SPCI-020	Thermocouple wire, Constantan for J-type, 0.020" diameter, 50 feet (15 m) spool, bare wire
SPCI-032	Thermocouple wire, Constantan for J-type, 0.032" diameter, 50 feet (15 m) spool, bare wire
SPCP-020	Thermocouple wire, Copper for T-type, 0.020" diameter, 50 feet (15 m) spool, bare wire
SPCP-032	Thermocouple wire, Copper for T-type, 0.032" diameter, 50 feet (15 m) spool, bare wire
SPCC-020	Thermocouple wire, Constantan for T-type, 0.020" diameter, 50 feet (15 m) spool, bare wire
SPCC-032	Thermocouple wire, Constantan for T-type, 0.032" diameter, 50 feet (15 m) spool, bare wire
SPCH-020	Thermocouple wire, Nickel-Chromium for K-type, 0.020" diameter, 50 feet (15 m) spool, bare wire
SPCH-032	Thermocouple wire, Nickel-Chromium for K-type, 0.032" diameter, 50 feet (15 m) spool, bare wire
SPAL-020	Thermocouple wire, Nickel-Aluminum for K-type, 0.020" diameter, 50 feet (15 m) spool, bare wire
SPAL-032	Thermocouple wire, Nickel-Aluminum for K-type, 0.032" diameter, 50 feet (15 m) spool, bare wire

Double Insulated Thermocouple Wire (PFA Teflon insulation)

TT-K-20, 25 ft	Double Insulated Thermocouple wire, K-type, 20 gage, 25 feet (7.6 m)
TT-K-20, 50 ft	Double Insulated Thermocouple wire, K-type, 20 gage, 50 feet (15 m)
TT-K-20, 100 ft	Double Insulated Thermocouple wire, K-type, 20 gage, 100 feet (30 m)
TT-J-20, 25 ft	Double Insulated Thermocouple wire, J-type, 20 gage, 25 feet (7.6 m)
TT-J-20, 50 ft	Double Insulated Thermocouple wire, J-type, 20 gage, 50 feet (15 m)
TT-J-20, 100 ft	Double Insulated Thermocouple wire, J-type, 20 gage, 100 feet (30 m)
TT-T-20, 25 ft	Double Insulated Thermocouple wire, T-type, 20 gage, 25 feet (7.6 m)
TT-T-20, 50 ft	Double Insulated Thermocouple wire, T-type, 20 gage, 50 feet (15 m)
TT-T-20, 100 ft	Double Insulated Thermocouple wire, T-type, 20 gage, 100 feet (30 m)

Twisted/Shielded Thermocouple Extension Wire (PVC or FEP Teflon insulation)

on wire, J-type, 20 gage, 1000 feet (304 m)
on wire, K-type, 20 gage, 1000 feet (304 m)
on wire, T-type, 20 gage, 1000 feet (304 m)
on wire, E-type, 20 gage, 1000 feet (304 m)

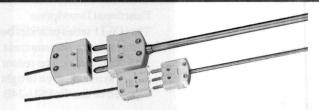
EXFF-J-20-TWSH	Twisted/Shielded Teflon extension wire, J-type, 20 gage, 1000 feet (304 m)
EXFF-K-20-TWSH	Twisted/Shielded Teflon extension wire, K-type, 20 gage, 1000 feet (304 m)
EXFF-T-20-TWSH	Twisted/Shielded Teflon extension wire, T-type, 20 gage, 1000 feet (304 m)
EXFF-E-20-TWSH	Twisted/Shielded Teflon extension wire, E-type, 20 gage, 1000 feet (304 m)

SENSORS & TRANSDUCERS

RTDs

RTD probes with quick disconnects

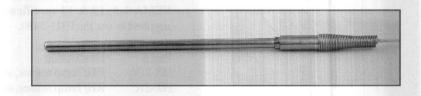
- 100 ohm 3-wire configuration
- DIN and American alphas
- 1/4" or 1/8" diameter probes
- 6" or 12" lengths
- Quick Disconnect (includes mating connector)



Part Number	<u>Description</u>	
PR-13-2-100-18-6-E	RTD probe, 100 ohm, a=0.00385, 1/8" (3.18mm) diameter, 6" long, quick disconnect	
PR-13-2-100-14-6-E	RTD probe, 100 ohm, a=0.00385, 1/4" (6.35mm) diameter, 6" long, quick disconnect	
PR-13-2-100-18-6-A	RTD probe, 100 ohm, a=0.00392, 1/8" (3.18mm) diameter, 6" long, quick disconnect	
PR-13-2-100-14-6-A	RTD probe, 100 ohm, a=0.00392, 1/4" (6.35mm) diameter, 6" long, quick disconnect	
PR-13-2-100-18-12-E PR-13-2-100-14-12-E PR-13-2-100-18-12-A PR-13-2-100-14-12-A	RTD probe, 100 ohm, a=0.00385, 1/8" (3.18mm) diameter, 12" long, quick disconnect RTD probe, 100 ohm, a=0.00385, 1/4" (6.35mm) diameter, 12" long, quick disconnect RTD probe, 100 ohm, a=0.00392, 1/8" (3.18mm) diameter, 12" long, quick disconnect RTD probe, 100 ohm, a=0.00392, 1/4" (6.35mm) diameter, 12" long, quick disconnect	

RTD probes with 36" stripped leads

- 100-ohm 3-wire configuration
- DIN and American alphas
- 1/4" or 1/8" diameter probes
- 6" or 12" lengths
- Pre-Stripped wire leads



Part Number	Description
PR-11-2-100-18-6-E	RTD probe, 100 ohm, a=0.00385, 1/8" (3.18 mm) diameter, 6" long
PR-11-2-100-14-6-E	RTD probe, 100 ohm, a=0.00385, 1/4" (6.35 mm) diameter, 6" long
PR-11-2-100-18-6-A	RTD probe, 100 ohm, a=0.00392, 1/8" (3.18 mm) diameter, 6" long
PR-11-2-100-14-6-A	RTD probe, 100 ohm, a=0.00392, 1/4" (6.35 mm) diameter, 6" long
PR-11-2-100-18-12-E PR-11-2-100-14-12-E PR-11-2-100-18-12-A PR-11-2-100-14-12-A	RTD probe, 100 ohm, a=0.00385, 1/8" (3.18 mm) diameter, 12" long RTD probe, 100 ohm, a=0.00385, 1/4" (6.35 mm) diameter, 12" long RTD probe, 100 ohm, a=0.00392, 1/8" (3.18 mm) diameter, 12" long RTD probe, 100 ohm, a=0.00392, 1/4" (6.35 mm) diameter, 12" long



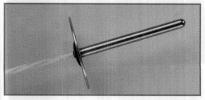
Miscellaneous RTD Configurations

RTD-809 RTD, button shaped, stainless steel, 100 ohm, a=0.00385



RTD-830

RTD, Aluminum screw mount housing, 100 ohm, a=0.00385



RTD-860

RTD, SS probe with 1" mounting flange, 100 ohm, a=0.00385

RELATIVE HUMIDITY



Functional Description

The HX-11 series provides both temperature and relative humidity outputs in 1-5Vdc or 4-20 mA outputs. Measurement range is 5-95% RH with $\pm 2\%$ accuracy and, 0 to 100 °C with ± 0.5 °C accuracy. The sensor is contained in a compact, 316 Stainless Steel cylinder and is easy to mount, even in tight locations. The sensor requires external 24 Vdc power (user supplied or use the PSU-24B power supply).

Part #	<u>Description</u>
HX-11V	RH/Temp sensor, stainless steel enclosure, 1-5 Vdc output
HX-11C	RH/Temp sensor, stainless steel enclosure, 4-20 mA output
PSU-24B	RH/Temp HX-series power supply



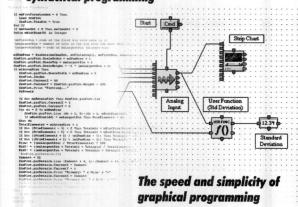
Functional Description

The HX-21 series provides both relative humidity and temperature output in 1 to 5 Vdc or 4-20 mA outputs. Measurement range is 5-95% RH with $\pm 2\%$ accuracy and, 0 to 100 °C with ± 0.6 °C accuracy. The sensor is contained in a lightweight, ABS plastic box and meets NEMA 1-5, 12 & 13 specifications. The sensor requires external 24 Vdc power (user supplied or use the PSU-24B).

Part #	<u>Description</u>
HX-21V	RH/Temp sensor, stainless steel enclosure, 0-5 Vdc output
HX-21C	RH/Temp sensor, stainless steel enclosure, 4-20 mA output
PSU-24B	RH/Temp HX-series power supply



The power and flexibility of syntactical programming



Introducing SoftWIRE™

Graphical Programming in Visual Basic®

Syntactical programming has been around since the early days of computers. More recently, graphical programming languages have been introduced and are now a popular alternative to writing hard core, text-based syntax. What's been lacking is an easy way to combine the speed and ease of use of graphical programming with the flexibility and efficiency of writing code in an industry standard language. Until now—Introducing SoftWIRE.

For more information on SoftWIRE, please see pages 6 -10 in this catalog.

SENSORS & TRANSDUCERS

PRESSURE & VACUUM

PX-41 Series Pressure Sensors

Features

- · Gage pressure & Absolute pressure models available
- 4-20 mA or 0.5-5.5 Vdc outputs
- NEMA4 rated
- 0.25% of full scale accuracy
- · All stainless steel construction



peci		

Fittings Dual 1/2 & 1/4 NPT

Accuracy: ±0.25% of full scale

4-20 mA or 0.5 - 5.5 Vdc Outputs:

Gage Type: Chemical vapor deposited

polysilicon strain gage

Weight: 100 grams

Connections: 36" shielded cable

Proof Pressure: 150% of full scale

Burst Pressure: 400% of full scale

Excitation required: 12-36 Vdc

@ 15 mA

(see the PST-28 power supply)

PX41TO-015G5V	Pressure sensor, 0-15 PSIG, 1/4-18 NPT, 0.5 to 5.5 Vdc output
PX41TO-030G5V	Pressure sensor, 0-30 PSIG, 1/4-18 NPT, 0.5 to 5.5 Vdc output
PX41TO-100G5V	Pressure sensor, 0-100 PSIG, 1/4-18 NPT, 0.5 to 5.5 Vdc output
PX41TO-500G5V	Pressure sensor, 0-500 PSIG, 1/4-18 NPT, 0.5 to 5.5 Vdc output
PYAITO IKGSV	Pressure sensor 0 1000 PSIC 1/4 18 NPT 0.5 to 5.5 Vdc outry

Description

Pressure sensor, 0-1000 PSIG, 1/4-18 NPT, 0.5 to 5.5 Vdc output PX41TO-015A5V Pressure sensor, 0-15 PSIG Abs pressure, 1/4-18 NPT, 0.5-5.5 V out PX41TO-030A5V Pressure sensor, 0-30 PSIG Abs pressure, 1/4-18 NPT, 0.5-5.5 V out

PX41TO-015GI Pressure sensor, 0-15 PSIG, 1/4-18 NPT, 4-20 mA output

PX41TO-030GI Pressure sensor, 0-30 PSIG, 1/4-18 NPT, 4-20 mA output Pressure sensor, 0-100 PSIG, 1/4-18 NPT, 4-20 mA output PX41TO-100GI Pressure sensor, 0-300 PSIG, 1/4-18 NPT, 4-20 mA output PX41TO-300GI PX41TO-1KGI Pressure sensor, 0-1000 PSIG, 1/4-18 NPT, 4-20 mA output

PX41TO-015AI Pressure sensor, 0-15 PSIG Abs pressure, 1/4-18 NPT, 4-20 mA out PX41TO-030AI Pressure sensor, 0-30 PSIG Abs pressure, 1/4-18 NPT, 4-20 mA out

PS-4G Pressure snubber & sensor protector for gaseous media, 1/4-18 NPT PS-4E Pressure snubber & sensor protector for water & light oils, 1/4-18 NPT PS-4D Pressure snubber & sensor protector for dense liquid, 1/4-18 NPT TX4-100 Pressure sensor extension cable, 4 conductor shielded, 100' long

PX-180 Series, low-cost pressure sensors

Features

- Gage, Differential and Vacuum models available
- 1-6 Vdc outputs
- NEMA4 rated
- 2% of full scale accuracy
- Very low cost

Specifications

PST-28

Part Number

Accuracy: ±2.0% of full scale

Outputs: 1-6 Vdc

Connection Port: 0.20" tube fitting

OverPressure: 300% of full scale Electrical

PX203/PX205 series PS, 120 Vac input, 28Vdc @ 150 mA output

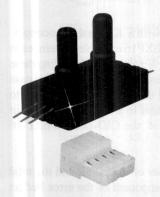
Connections: via 3 PC board compatible

pins. Mating connector CX136-4 (not included).

Excitation required: 8 Vdc regulated @6 mA

(see the PST-8 power

supply)



Part Number

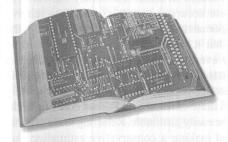
PX-184-005V5V Pressure-Vacuum sensor, -5 to 0 PSIV, 0.2" tube fitting, 1-6 Vdc out PX-184-015V5V Pressure-Vacuum sensor, -15 to 0 PSIV, 0.2" tube fitting, 1-6 Vdc out

Pressure sensor, 0-15 PSIG, 0.2" tube fitting, 1-6 Vdc output PX-185-015D5V Pressure sensor, 0-30 PSIG, 0.2" tube fitting, 1-6 Vdc output PX-185-030D5V

PX-186-2.5BD5V Pressure sensor, differential, +/-2.5 PSID, 0.2" tube fitting, 1-6 Vdc out PX-186-15BD5V Pressure sensor, differential, +/-15 PSID, 0.2" tube fitting, 1-6 Vdc out

CX136-4 Connnector for PX-180 series PST-8 PX-140 series power supply, 120VAC input, 8 Vdc @ 300 mA output

Glossary



At ComputerBoards, we recognize that our valued customers have diverse backgrounds, many outside the realm of electronics or engineering. This Glossary provides concise definitions of terms used frequently in our catalog.

Absolute Accuracy

Typically used to describe the maximum or worst case error of a system when all potential system errors are considered.

Acquisition Rate

The rate at which samples are acquired. Typically described in terms of samples per second, kilosamples per second or Megasamples per second. Often also referred to in terms of Hz, kHz or MHz where 1 Hz represents 1 sample per second.

ActiveX Control (a.k.a. OLE Controls)

A special function object that can be readily used by an OLE-enabled application, tool, or web browser. Examples include the functions in ComputerBoards' VIX Components and SoftWIRE products.

A/D

Analog-to-digital.

ADC

Analog-to-Digital Converter. An electronic device, typically an integrated circuit, that converts an analog input voltage into a digital value.

Alias

A false or erroneous low-frequency waveform or component that may appear in acquired data when sampled at too low a sampling rate.

Analog Trigger

A trigger that is based on an analog threshold level. For example, you may wish to start your data acquisition scan when the input voltage first passes through 3.5 volts. To accomplish this you would set your analog trigger level to +3.5 V.

API

Application Programming Interface.

ASIC

Application Specific Integrated Circuit
A custom semiconductor component
developed to perform a specific set of
functions. ASICs allow a large amount of
digital logic to be combined into a single chip.

Asynchronous

A process or event that occurs without synchronization to a reference clock.

Background

A DAQ system task (such as acquiring data) that occurs without interruption while another program routine is running.

Bandwidth

A description of the highest frequency signal component that will pass through an amplifier and/or filter. Bandwidth is typically specified as the frequency where the attenuation is 3 dB.

Base Address

The I/O or memory address that serves as the primary address for programmable registers. All other addresses are typically referenced relative to the base address (e.g., Base +2, or Base +8).

Baud Rate

A serial communications data transfer rate expressed in bits per second (b/s).

Bipolar

An input or output range that includes both positive and negative voltages (e.g., ±5 V).

Bit

A single binary digit, either 0 or 1. The bit is the basis for all digital logic.

Break Before Make

A relay or switch configuration in which one connection is completely broken from before the next is connected.

Breakdown Voltage

The voltage high enough to cause breakdown of optical isolation, semiconductors, or dielectric materials. See also *Working Voltage*.

Burn-In

An operation in which a device is powered up for a period of time to stabilize and remove devices subject to infant mortality prior to moving them to the next manufacturing stage, or shipment to customers.

Burst Mode

Sample data is acquired on adjacent channels at the maximum sample rate, while a longer time interval is inserted between scans. This mode is often referred to as pseudo-simultaneous sample and hold.

Bus Master

A type of a plug-in board or controller with the ability to take control of the computer's data bus and perform reads and/or writes without requiring the use of the host CPU.

Byte

Eight bits of data, representing an eight-bit binary number. A byte has a value from 0 to 255 (decimal).

Channel Gain Queue

A user-defined arbitrary sequence of channels with corresponding gains or input ranges. Utilizing a Channel Gain Queue you may create complex scan sequences that exactly match your application's requirements.

CMRR or Common Mode Rejection Ratio

A measure of input's ability to ignore or reject errors caused by varying ground potentials between the signal source and the measurement device. CMRR is usually expressed in decibels (dB).

Cold-Junction

An unavoidable thermocouple junction that occurs where a thermocouple is connected to a measurement system.

Cold-Junction Compensation

A system developed to remove the error caused by the thermocouple's cold-junction.

Common Mode Voltage

A voltage between the ground of a signal source and the ground of the measurement device.

CompactPCI

A new bus configuration based on the popular PCI bus, but modified and enhanced for industrial applications.

Contact Bounce

The temporary, undesirable opening and closing of contacts that occurs when a relay or switch is closed.

Contact Life

The number of openings/closures of a relay or switch that can be expected before failure.

Contact Rating

The maximum voltage, current, and/or power capacity of relay or switch contacts.

Contact Resistance

The resistance across a set of closed contacts, typically measured in ohms.

Counter/Timer

A circuit or device that can be used to count or generate digital pulses or edges. Counter/Timers are often used to set sample timing.

Crosstalk

An unwanted error signal created on one channel by a varying input on another adjacent channel.

Current Drive Capability

The current that a digital or analog output is capable of sourcing or sinking while still maintaining its voltage range specifications.

D/A

Digital-to-Analog.

DAC or D/A Converter

Digital-to-Analog Converter. An electronic device, that converts a digital number into a corresponding analog voltage or current.

DAO

Common abbreviation for "Data Acquisition"

dB or Decibel

A common unit used to express the logarithm of the ratio of two signal levels: $dB = 20log_{10} V2/VI$, for signal voltages or $dB = 10log_{10} P2/PI$, for signal powers.

DDE

Dynamic Data Exchange. A software protocol in Microsoft Windows for interapplication communication. DDE allows a data acquisition application to share data real-time with Windows applications such as Microsoft Excel.

Delta-Sigma A/D Converter

A highly flexible type of A/D converter that allows the user to trade off accuracy versus sample rate. A single converter can be used for high accuracy, low sample rate applications and then may be reconfigured for lower accuracy, higher speed applications.

Derivative Control

The D in PID control, derivative control acts on the rate of change of an input or error and provides a very quick control response to a rapidly changing process (m=Ddi/dt) or m=Dde/dt, but rarely used alone).

Differential Input

A differential analog input consists of two input terminals as well as a ground connection. The input actually measures the difference between the two inputs without (see *CMRR*) regard to ground potential variations.

Digital Trigger

A trigger that is based on a standard digital threshold level.

DLL

Dynamic Link Library. A Windows-based file containing executable code that is run by other Windows applications or DLLs.

DNL

Differential Nonlinearity. A measure in LSB of the worst-case deviation of code widths from their ideal value of 1 LSB.

DMA or DMA Mode

Direct Memory Access. A method by which data can be transferred to/from computer memory from/to a device or memory on the bus while the processor does something else. DMA is the fastest method of transferring data to/from computer memory.

Drift

A gradual change of a reading with no change in the input signal or operating conditions.

Drivers

Software that controls a specific hardware device, such as DAQ boards, GPIB interface boards, PLCs, RTUs, and other I/O devices.

DSP

Digital Signal Processing.

Dual-Ported Memory

Memory that can be accessed by multiple controllers or processors. Dual-ported memory is commonly used on "intelligent" boards, enabling the on-board processor and the PC's CPU to asynchronously share data.

Duty Cycle

The ratio of pulse width to overall signal repetition period.

Dynamic Range

The ratio of the largest signal an input will measure to the smallest signal it can detect. Normally expressed in dB $(20 \log_{10} V2/VI)$.

EEPROM

Electrically Erasable Programmable Read-Only Memory. A nonvolatile memory device that can be programmed and erased with electrical controls signals.

Encoder

A device that converts linear displacement or a rotation into a stream of digital/pulse signals.

EPROM

Erasable Programmable Read-Only Memory. A nonvolatile memory device that can be programmed, and will retain its memory until erased by exposure to high intensity UV. Once erased the EPROM may be reprogrammed.

External Trigger

A signal used to start or stop an event such as a scan of A/D channels (See also *Analog Trigger* and *Digital Trigger*).

FIFC

First-In First-Out Memory. A specialized type of memory buffer. Data is entered on side of the buffer, is stored for a time and exits on the other side. The unique function of the FIFO is that the data order is preserved, and data leaving the memory leaves in the same order it arrived. FIFO buffers are used extensively between A/D converters and the PC bus.

Flash ADC

An extremely high-speed analog-to-digital converter. The output code is determined in a single step by comparing the input signal to a series of references via a bank of comparators.

Floating

A condition in which there is no electrical connection between the ground potentials of the signal source and the measurement system.

Foreground

An operation that is directly controlled by the active software application (see *Background*).

Gain

A factor by which a signal is amplified, typically expressed in terms of "times" a number. Examples include *X10* and *X2* where the signal amplitude is multiplied by factors of *10* and *2*, respectively.

Gain Accuracy

A measure of difference between the actual gain of an amplifier from the specified gain.

Gate

A signal that, depending on the condition, either enables or disables an operation to occur.

Glitch Energy

Glitches are undesirable transients that occur as the output of a digital-to-analog converter moves from one value to another. The glitch energy provides a measure of the magnitude of the glitch both in amplitude and duration.

GPIB

General Purpose Interface Bus, originally developed by Hewlett-Packard and designated HP-IB. Also known as IEEE-488, this bus is an industry standard used to interface a wide assortment of instruments to computers.

GUI

Graphical User Interface. A simple computer user interface in which the user interfaces with a computer via simple graphic displays or icons rather than text. GUIs often resemble common objects (e.g., stop signs) and are frequently developed to provide a "virtual" representation of a variety of instrumentation and data acquisition objects.

Ground

A reference potential in an electrical system.

IEEE 488

See GPIB.

Impedance

The ratio of the voltage across a device or circuit to the current flowing in it. In AC circuits, the impedance takes into account of effects of capacitance and inductance. In most data acquisition specifications, the impedance listed is actually the dc impedance, which is the same as the resistance (in ohms).

INL

Integral NonLinearity. A measure of the worst-case deviation between the ideal and actual characteristics of an A/D or D/A converter circuit.

Input Bias Current

The undesirable current that flows in to or out of the inputs of an analog input device or system.

Input Impedance

The impedance between the input terminals of a circuit. Although impedance implies AC characteristics that are affected by inductance and capacitance, most data acquisition specifications simply list the dc component of resistance (see *Impedance*).

Input Offset Current

The difference in the input bias currents of the two inputs an analog input device or system.

Instrumentation Amplifier

A circuit whose output voltage with respect to ground is proportional to the difference between the voltages at its two inputs.

Integral Control

The "I" in PID Control, integral control acts to balance supply to a process with the load on it. In so doing, it keeps the measured variable at the desired point and error at zero. The integral function acts on the error signal multiplied by the time it would take to reset the error to zero. If error changes, a larger or smaller integral control signal is created over time to return the error signal to zero (m=1/I/edt). Can be used alone or with P or P+D control algorithms.

Integrating ADC

A slow but highly accurate and noise-immune analog-to-digital converter.

Internal Trigger

A software-generated condition or event that serves to start an operation or function (see *External Trigger*).

Interrupt

An internal computer signal request that the CPU suspend its current task, perform another task, and then return to the original task or program.

Interrupt Level

A priority hierarchy that allows the computer to prioritize which Interrupt to service first when more than one Interrupt request has been issued.

Interrupt Service Request (IRQ)

A hardware notification to the CPU that an interrupt has been generated and CPU control should be transferred to the corresponding Interrupt Service Routine.

Interrupt Service Routine (ISR)

A software program that is engaged by an interrupt. This program typically performs a specific time-sensitive function and then returns control of the computer to the original application or program.

1/0

Input/Output. The transfer of data to/from a computer system involving communications channels, operator interface devices, and/or data acquisition and control interfaces.

Isolation

Two circuits or devices are isolated when there is no electrical connection between them. Isolated circuits can be interfaced to each other via optical or electromagnetic circuits. A signal source is sometimes isolated from the measurement device in order to provide protection to the measurement device.

Isothermal Block

A block of thermally conductive material (typically copper or aluminum) that is used to help ensure that all contacts or screw terminals on a board are maintained at the same temperature. Isothermal blocks are very useful in minimizing cold-junction errors in thermocouple measurements.

k or K

Kilo, the metric prefix for 1,000. When used with units of measure such as volts, amps or hertz, the "k" is typically not capitalized and stands for exactly 1000. When used to describe memory size (e.g. Kilobytes or Kbytes), the "K" is usually capitalized and actually stands for a factor or 1024 (e.g. 1 Kilobyte is 1024 bytes).

kbytes/s

A data transfer specification equal to 1,000 bytes/sec.

Linearity

The measure of a devices transfer function relative to a perfect Y=mX straight line response.

LSB

Least Significant Bit.

LSTTL

An abbreviation for the Low power Schottky-clamped TTL logic family.

M

Mega, the metric prefix for 1,000,000. When used with units of measure such as volts, amps or hertz, the "M" stands for exactly 1000,000. When used to describe memory size (e.g. Megabytes or Mbytes), the "M" actually stands for a factor or 1,048,576 (2¹⁰).

m

Milli is the metric prefix for one-thousandth (1/1000). Thus, *mA* is thousandths of an Amp.

Mbytes/s

A data transfer specification equal to 1,000,000 bytes/sec.

Mercury Wetted Relay

A relay in which the contact surfaces are actually coated by a film of liquid mercury. This wetting virtually eliminates the contact bounce associated with dry relays as well as often offering lower "on" resistance and longer contact life.

Multiplexer

A switch that allows one of multiple inputs to be selected and connected to a single output. Multiplexers are commonly used in DAQ products to allow a single A/D converter to acquire data from multiple analog input channels.

Mux

See Multiplexer.

Nyquist Theorem

A sampling theory law that states that to create an accurate digital representation of a sampled waveform you must sample the waveform at least twice as fast as the highest frequency component contained in the waveform. Note that this is a minimum condition and in most applications it is better to sample at 3 to 4 times the highest expected frequency component.

OCX

An abbreviation for an OLE Custom Control.

OLE

Object Linking and Embedding
A protocol that allows multiple applications to seemlessly interact. Based on the Microsoft's Component Object Model (COM), OLE allows compatible objects to operate in a variety of applications and environments.

OLE Control

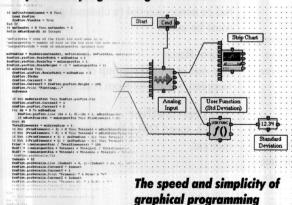
See ActiveX Controls.

Optical Isolation

The use of one or more light transmitters and receivers (typically in the form of an LED and a Photodetector) to transfer digital signals between devices or systems without requiring an electrical connection between them.

SoftWIRE™ Graphical Programming for Visual Basic

The power and flexibility of syntactical programming



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Graphical Programming in Visual Basic®

Syntactical programming has been around since the early days of computers. More recently, graphical programming languages have been introduced and are now a popular alternative to writing hard core, text-based syntax. What's been lacking is an easy way to combine the speed and ease of use of graphical programming with the flexibility and efficiency of writing code in an industry-standard language. Until now—Introducing SoftWIRE.

For more information on SoftWIRE, please see pages 6 -10 in this catalog.

Output Settling Time

The time required for an analog output to change to and stabilize at its final value. Typically specified within limits such as 0.01% or 0.004%.

Output Slew Rate

The rate of change of analog output voltage as it changes from one output voltage to another. Slew rate is typically specified in volts per microsecond.

Pacer or Pacer Clock

An on-board or external timing source that sets the timing for events such as analog-to-digital and digital-to-analog conversions.

Parts Per Million (PPM).

A relative term typically used in drift specifications. One part per million is equivalent to 0.0001%

PC-Card

A credit-card-sized expansion card that fits in a PCMCIA slot—often referred to as a PCMCIA card.

PCI

A very high-performance expansion bus architecture developed by Intel to replace ISA and EISA. It has achieved widespread acceptance as a standard for PCs. It supports a theoretical maximum transfer rate of 132 Mbytes/s.

PCMCIA

The de facto standard notebook computer interface bus. It was originally developed for add-on memory cards by the Personal Computer Memory Card International Association.

Photoelectric Sensor

An electrical device with an output related to level of light falling on it.

PID Control

A three-term control algorithm that combines proportional, integral, and derivative control actions. See proportional control, integral control, and derivative control $(m=100/PB(e)+1/I\int edt+Ddi/dt)$.

Plug and Play

Plug-in boards that are fully configured in software, without the need for jumpers or switches on the boards.

Port

A communications connection of one or more inputs on a computer. Common port types include RS-232 & USB

Postriggering

The technique used on a DAQ board to acquire a desired number of samples after trigger conditions have been met.

Potentiometer

A continuously adjustable variable resistor. They are used for adjustment of electrical circuits and as a transducer for either linear or rotary position transmission.

Pretriggering

A technique used on a DAQ board in which a buffer is continuously filled with data. When the trigger occurs, the sample includes all data leading right up to the trigger.

Programmed I/O

A data transfer method where the data is read or written by the CPU.

Propagation Delay

The amount of time required for a signal or disturbance to pass through a circuit or process.

Proportional Control

A control action in which the amount of control action is determined by a gain multiplied by an error signal. The gain term may be specified directly or as the reciprocal of a theoretical band over which error causes a 100% control action (m=100/PB*e).

Quantization Error

The uncertainty that is inherent when digitizing an analog value due to the finite resolution of the conversion process.

Real Time

A method of operation in which data is processed as it is acquired instead of being accumulated and post-processed Process control is generally done in real time where accounting is not.

Relative Accuracy

A measure of accuracy (typically in LSBs) of an A/D converter. It includes all nonlinearity and quantization errors. It does not include gain and offset errors of the circuitry ahead of the A/D converter.

Reset Control

See Integral Control.

Resolution

The smallest increment that can be detected or transmitted by a data acquisition or measurement system. Resolution are expressed in bits, in proportions, or in percent of full scale. For example, if a system has 12-bit resolution, it equals one part in 4,096 for resolution, or 0.0244 percent of full scale.

Ribbon Cable

An inexpensive flat cable in which the conductors lie side-by-side.

Rise Time

The time required for a signal to change from a low level (usually 10%) to a high level (usually 90%) of its base line-to-peak or peak-to-peak amplitude. See also *Fall Time*.

RMS

A value that is equal to the root-mean-square (RMS) of the input signal. It applies to all input waveforms that have components within a specified frequency range and within a crest factor limit.

RTD

Resistance Temperature Detector. A sensor probe that measures temperature based on changes in resistance.

Sample Rate

The rate at which a signal or value is sampled. It is frequently expressed as samples/sec (S/s), kilosamples/sec (kS/s), or Megasamples/sec (MS/s).

Scan

Look at a group of channels at an acquisition or burst-mode rate. May refer to a group of channels. The channels may be sequential or nonsequential (a channel-gain queue must be used).

Scan Rate

The rate at which a group of channels is sampled, measured from scan to scan.

Scatter-Gather

A high-speed DMA burst-mode transfer method.

SCPI

Standard Commands for Programmable Instruments. An extension of IEEE 488.2 standard defining standard programming commands and syntax for device operations.

SE

Single-ended describes an analog input circuit in which the input signal is measured with respect to a common ground.

Self-Calibrating

A feature of a DAQ board that uses a stable on-board voltage reference and calibrates its own A/D or D/A circuits without need for manual adjustments.

Sensor

A device that responds to stimulus such as temperature, light, sound, pressure, motion, or flow and produces an output that can be measured to learn about the particular condition being monitored

Settling Time

The time required for a voltage to stabilize to its final value (usually within a specified error range).

S/H

Sample-and-Hold. A circuit that acquires and stores a signal (e.g., an analog voltage) on a capacitor or other storage element for a period of time.

Single-Ended Input

An analog input having input terminals that are measured with respect to a common ground. See also *Differential Inputs*.

Slew Rate

The specified (typically maximum) rate of change of a D/A converter or amplifier/buffer output. It is expressed in volts/microsecond.

S/N or SNR

Signal-to-Noise Ratio. The ratio of the overall signal level to the noise level, typically expressed in dB.

Software Trigger

A event that is started (triggered) based on software control

SPDT

Single-Pole, Double-Throw. A switch or relay configured sot that one terminal can be connected to either of the other terminals.

SIS

Samples Per Second.

Strain Gauge

A sensor with resistance that varies based on being stretched or compressed. When attached to a solid object with known physical properties, the deflection can easily be converted in units measuring force.

Subroutine

A group of software instructions separate from the main program that executes a specific function upon command and then returns control to the main program.

Successive-Approximation A/D Converter

An ADC that sequentially compares a diminishing series of binary-weighted values generated by a D/A converter against the analog input.

Synchronous

A timing configuration where events occur in step with a reference clock or timer.

System Noise

A measure of residual noise of a circuit that is not related to the input.

Talker

A GPIB device that sends data to one or more Listeners on the bus.

Temperature Coefficient

The change of value or function corresponding with a change in temperature. This is often expressed as a percentage of reading per degree or in PPM (parts per million) per degree.

T/H

Track-and-hold. A circuit that tracks a signal and holds the present value on command. Similar to Sample-and-hold

THD

Total Harmonic Distortion. The ratio of the total signal generated by harmonic distortion to the overall signal, expressed in dB or percent.

Thermistor

A type of resistive temperature sensor. The thermistor resistance changes as a function of temperature.

Thermocouple

A temperature sensor made by fusing together dissimilar metals. The junction produces a small voltage (referred to as the Seebeck voltage) that is a function of temperature.

Throughput Rate

The rate that data, measured in bytes per second or words per second, can be passed over a bus on communications link.

Transducer

See Sensor.

Transfer Rate

The rate, measured in bytes per second or words per second, at which data can be moved from a source to a destination.

Trigger

A signal that is used to start or stop an operation. Triggers can be an analog, digital, or software event.

Trigger polarity

Trigger polarity defines whether the trigger occurs when the signal is rising in a positive direction or falling in a negative direction.

UART

Universal Asynchronous Receiver/ Transmitter. An IC that converts parallel data to serial data and vice versa. UARTs are the backbone of virtually all RS-232/485 computer interface boards.

Unipolar

A signal range from ground to a positive value (e.g., 0 to +5 V).

USB

Universal Serial Bus. A new high speed serial bus.

Virtual Instrument

A combination of hardware and software elements that emulates a stand-alone instrument both in electrical function and in the computer screen representation.

Word

A standard number of bits that a processor manipulates at a time. Microprocessors typically use 8, 16, or 32-bit words. A word may also refer to 16-bits, where 8 bits is a byte and 32 bits is a double word.

Automatic Calibration—How does it work?

All ComputerBoards PCI-based multifunction analog I/O boards implement automatic calibration. The inherent "hands off" approach of the PCI Plug and Play standard makes this bus the natural choice for autocal designs. For the user, autocal eliminates the need for external calibration equipment and the adjustment of mechanical potentiometers. All gain and offset corrections are made to the board via digital potentiometers and/or calibration DACs (digital-to-analog converters), and require no intervention by the user.



Simply click on the "calibrate" icon in *Insta*CalTM and the calibration process begins. The calibration

will be complete in a few minutes, and the correction coefficients for all gains/offsets will be stored on-board in a nonvolatile memory. The ComputerBoards Universal Library will automatically apply these coefficients on a per-range basis. *These are true hardware adjustments*, not post-processing of the raw data via software corrections.

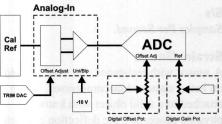


Several different architectures exist depending on the type of product being calibrated. For instance, an

analog input/output board such as the PCI-DAS1200 calibrates its A/D first and then uses this calibrated A/D as the measurement system to adjust the D/A portion of the board. Analog output boards such as the PCI-DDA08/12 have no ADC (analog-to-digital converter) available and employ a novel technique of dithering the analog output against a precision reference providing highly accurate results. Regardless of the technique all ComputerBoards auto-calibrated products provide the highest level of absolute accuracy, unmatched in the industry.

The basic elements of any auto-calibration system are: an ultra-stable precision voltage reference, trimmer devices, and nonvolatile memory. The heart of the system is the voltage reference and its stability. Selected to have an extremely low temperature coefficient of drift (typ. <5ppm/deg C) and excellent long-term stability (<< 10ppm/1000hr) this reference becomes the basis of all measurements. Since the reference is characterized with a 61/2-digit NBS-traceable DMM and stored in nvRAM, the absolute accuracy is not critical. Each time the calibration is performed this voltage value is retrieved from on-board memory and the all adjustments are made with respect to this standard.

Front-end offset corrections are typically performed at the gain stage and/or the ADC input. The analog inputs are shorted to low-



A typical analog input calibration scheme.

level ground and the offset trimmers are adjusted until the ADC produces the expected output code for a zero volt input. Gain is typically manipulated via the ADC reference voltage. The gain trimmer is adjusted until the ADC output code matches the code which corresponds the precision reference value stored in nvRAM.

For cards with an on-board ADC, the analog output calibrations are straightforward. The DAC outputs are wrapped around to the ADC via the calibration mux. The calibrated ADC serves as the system voltmeter for the DAC gain and offset corrections. The DAC gain can be calibrated to the same precision as the ADC with a $\pm 1/2$ LSB penalty due to quantization error of the ADC. In practice this effect is minimal due to averaging with the ADC and calibrated DACs are typically absolute accurate to within ±1 LSB. Offset calibrations are extremely precise since the ADC is subranged to accommodate only the zero volt region of the entire DAC output swing affording a high-resolution offset measurement. Offset corrections are made in the output buffer stage while gain adjustments are made to the DAC reference voltage.

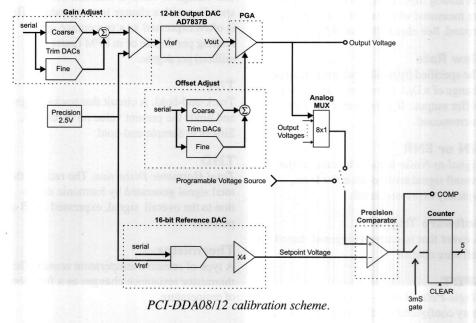


For cards without an on-board ADC, like the PCI-DDA0x/12 family, a different technique is employed to reduce the cost of adding an

expensive ADC. ComputerBoards' novel approach uses a precision comparator and a 16-bit DAC to create an accurate and inexpensive 1-bit ADC. The 16-bit DAC is software calibrated at the factory with a precision voltage source. This calibrates not only the 16-bit DAC, but the precision comparator as well. The calibration values are stored on the board in nonvolatile memory and used when calibrating the 12-bit output DACs

Offset and gain calibration is performed for each analog output at all ranges. During offset calibration, the 16-bit DAC is set to zero volts. The coarse offset DAC is then adjusted until a 1-bit change causes the precision comparator to change state. This is then repeated for the fine adjust. If there is sufficient noise in the system to cause the comparator to toggle, the 5-bit counter is used. The procedure is then repeated for gain adjust with the 16-bit DAC set to + full scale -1 LSB for the range being calibrated. The offset and gain calibration values are then stored in nonvolatile memory for each range.

Regardless of the calibration method used, most adjustments consist of both a fine and coarse trims. This is in an effort to maximize calibration range while maintaining significant trimming resolution. The coarse adjustment is intended to bring the parameter within the fine adjust range; the fine adjust completes the calibration.

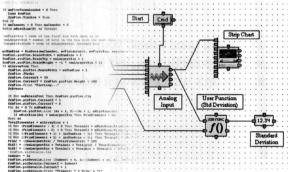


DIGITAL I/O FAMILY SPECIFICATIONS

Symbol	Parameter	Conditions	Min	Typ	Max	Units
Vih	High level input voltage	Conditions	2.0	TIP	TTAGE.	V
Vil	Low level input voltage				0.8	V
Iih	High level input current	Vi = 2.7 V			20	uA
Iil	Low level input current	Vi = 0.4 V	-0.5		-0.4	mA
Voh	High level output voltage	Ioh = -0.4 mA	2.7	3.4		V
Vol	Low level output voltage	Iol = 4 mA $Iol = 8 mA$			0.4 0.5	V
STTL FAMIL	V (74S series)	101 – 8 IIIA			0.5	
Symbol	Parameter	Conditions	Min	Typ	Max	Units
Vih	High level input voltage	Contributions	2.0		2.25	V
Vil	Low level input voltage		2.0		0.8	V
Iih	High level input current	Vi = 2.7 V			20	uA
Iil	Low level input current	Vi = 0.4 V	-0.5		-200	uA
Voh	High level output voltage	Ioh = -1 mA	2.7			V
		Ioh = -15 mA	2.0			
Vol	Low level output voltage	Iol = 12 mA			0.4	V
		Iol = 64 mA			0.55	V
CMOS FAMIL	LY					
Symbol	Parameter	Conditions	Min	Typ	Max	Units
Vih	High level input voltage		2.0		5.0	V
Vil	Low level input voltage		-0.5		0.8	V
Iih	High level input current	Vi = 5V			10	uA
Iil	Low level input current	Vi = 0.0 V			-10	uA
Voh	High level output voltage	Ioh = -2.5 mA	3.0			V
		Ioh = -100 uA	4.6			V
Vol	Low level output voltage	Iol = 2.5 mA			0.4	V
HC FAMILY	(high current CMOS)					
Symbol	<u>Parameter</u>	Conditions	Min	Typ	Max	Units
Vih	High level input voltage		3.3			V
Vil	Low level input voltage				1.1	V
Iih	High level input current	Vi = 5V			1	uA
Iil	Low level input current	Vi = 0.0 V			-1	uA
Voh	High level output voltage	Ioh = -8 mA	4.4			V
		Ioh = -50 uA	4.9	5.0		V
		2011 00 011				
Vol	Low level output voltage	Iol = 8.0 mA		0.36	.44 0.1	V V

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The speed and simplicity of graphical programming

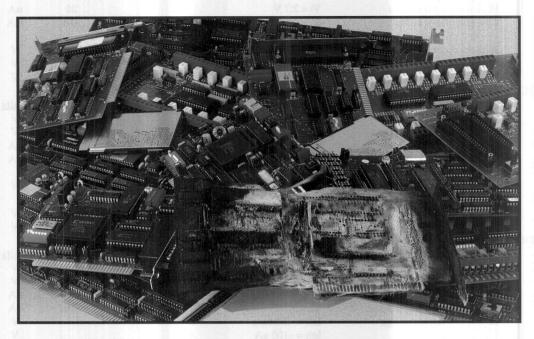
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For more information on SoftWIRE, please see pages 6 -10 in this catalog.

HARSH ENVIRONMENT WARRANTY THE



Zap! Whether from mis-wiring, short-circuits, power surges or lightening strikes, all of the above boards met with untimely ends. Their owners took advantage of our Harsh Environment Warranty™ and bought their replacement board at 50% off our US list price!

You know the story. New data acquisition board, hot project, tight budget, first signal hookup and *phzzzt*, the board takes a 115 Vac direct hit, or the power company chooses today to let through that big spike. You send the board back to be repaired and a couple days (or weeks) later the board comes back to you with a little note saying something like "U6 & U9 etches blown, uneconomical to repair."

Uneconomical to repair? Sure, when they think they might sell you a brand new replacement at full price!

What now? The project is behind schedule, and slightly over budget. Your manager is asking, "why?" This is not a good time to announce that the data acquisition board needs to be replaced *at full price!*

There's only one thing to do. Take advantage of our *Harsh Environment Warranty*TM. Any product manufactured by ComputerBoards, Inc. that is damaged (even due to misuse) may be replaced for 50% of the current list price. I/O boards face some harsh environments, some harsher than I/O boards are designed to withstand. When that happens, just return the board with an order for its replacement at only 50% of the list price. ComputerBoards doesn't need to profit from your misfortune.

When accidents happen, you want to know that the people you do business with will stand behind you, get you back to work quickly, and not take advantage of you when you're in a tight spot. ComputerBoards, Inc. knows how to support our customers. There is a better way to do business and at ComputerBoards we are doing it today!

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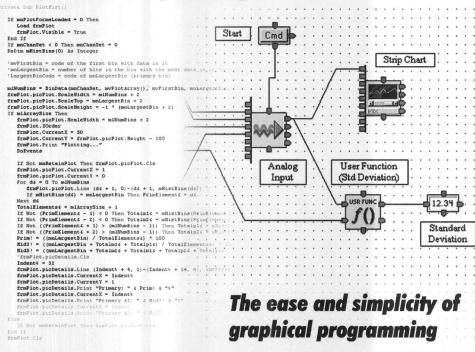
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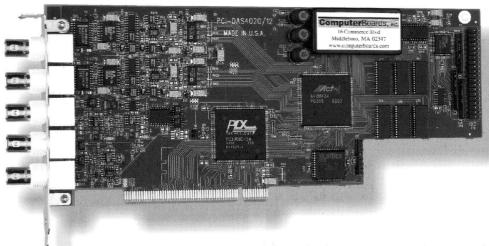
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Introducing the PCI-DAS4020/12

Ultra High-Speed, 20 MHz, PCI-bus Compatible, 4-Channel, 12-Bit Analog Input Board with Dual Analog Output Channels & 24 Digital I/O bits



An Outstanding Value!

Features

- 20 MHz sample rate (each channel)
- 12-bit A/D resolution
- 4 input channels
- Software selectable input ranges
- One A/D per channel
- Bus-master & Scatter-gather capable
- Dual 12-bit D/As
- Analog and digital triggering
- 24-bits of digital I/O
- Fully Plug-and-Play
- Fully Auto-calibrating

High Performance and Outstanding Value!

The PCI-DAS4020/12 sets a new standard for high-speed data acquisition performance on the PCI bus. Offering four 12-bit analog inputs with sample rates up to 20 MHz, each input channel has an independent A/D converter. This allows each channel to sample at the full 20 MHz (80 MHz aggregate board rate). The board provides analog and digital input triggering and pre-, post- and about-trigger sampling. The PCI-DAS4020/12 also offers 24 bits of digital I/O and two 12-bit analog outputs.

The PCI-DAS4020/12 is completely plug-and-play and auto-calibrating. There are no switches, jumpers, or potentiometers on the board.

The PCI-DAS4020/12 includes Insta*Cal*, ComputerBoards' powerful installation and test utility. The board is fully supported by the Universal Library as well as Soft-WIRE, DAS Wizard, and a wide variety of third party software applications.

Once again, ComputerBoards has proven that high performance doesn't have to mean high prices. The PCI-DAS4020/12 is an outstanding value!

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Tel: 604-618-0530 • Fax: 604-618-0531

Tel: 604-618-0530 • Fax: 604-618-0531 Tel: 613-829-9246 • Fax: 450-689-0868

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